Antic™

The ATARI® Resource

JULY 1983, VOLUME 2, NUMBER 4

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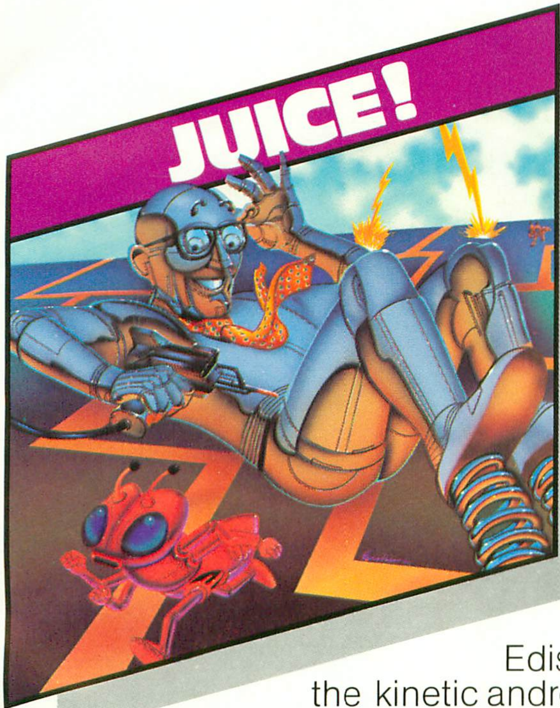
That's right. And that's not all.

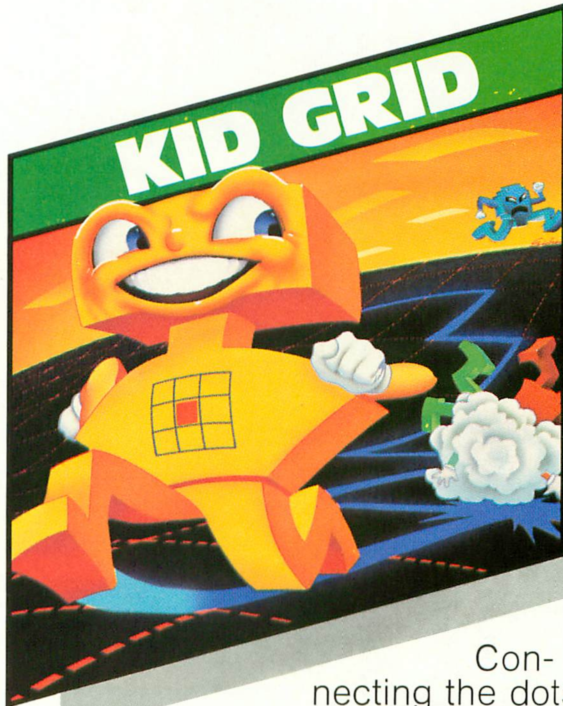
Electronic Games calls the Kid "Hypnotic, appealing, fast-moving arcade action of the highest calibre, ...one of the most compulsive, utterly addictive contests in the world of computer gaming."

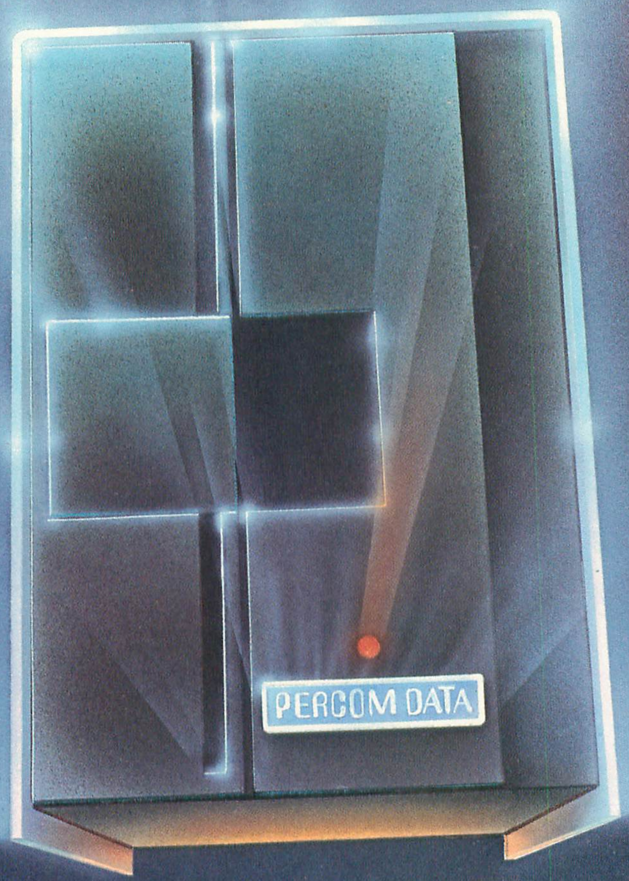
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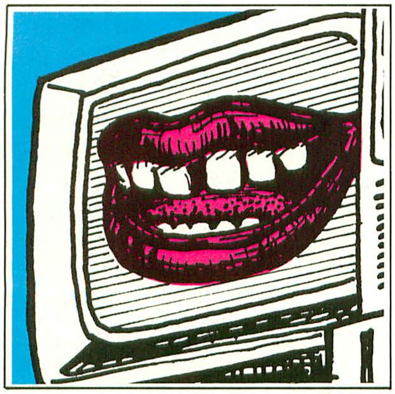
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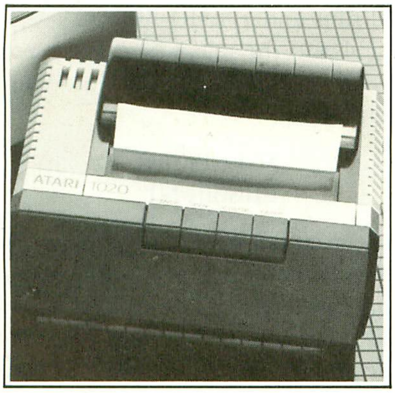
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The ATARI® Resource

JULY 1983, Volume 2, Number 4

FEATURES



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3-D MAZE MODIFICATIONS

3-D Maze is the best computer magazine game I've ever seen. I found a few additions very helpful, however. To eliminate the annoying possibility of a very short path to the exit, constrain the start position to be near the center of the maze:

```
460 X=INT(RND(0)*6+(MD-
    7)/2)+XM+1
462 Y=INT(RND(0)*6+(MD-
    7)/2)+YM+1
```

It's very nice at the end to be able to see the path you've traversed by pulling the joystick backwards:

```
653 IF STICK(0)=13 THEN G
    OSUB 700
654 IF STRIG(0)=1 THEN SO
    UND 0,RND(0)*200,10,2:
    GOTO 653
655 RUN
```

However, the score should not be penalized for doing so:

```
705 IF A$(A,A)<>E$ THEN
    PT=PT+10*MD
782 PT=PT+1:IF A$(A,A)=E
    $ THEN PT=INT(PT/10)*
    10
783 POKE 656,0:POKE 657,23
    :PRINT " SCORE ";PT;
```

Finally, a compass is needed to orient yourself in the maze:

```
465 DIR=0
504 IF S=11 THEN DIR=DIR-
    1:GOSUB 950:GOTO 515
506 IF S=7 THEN DIR=DIR+1
    :GOSUB 970:GOTO 515
20070 NEXT I
20080 POKE 656,1:POKE 657,34
20090 IF DIR=-1 THEN DIR=3
20100 IF DIR=4 THEN DIR=0
20110 GOSUB DIR+20410:RETUR
      N
20410 ? "▛ ^ ▜↓←←←|||↓←←
      ←▙|▟";:RETURN
20411 ? "▛▬▜↓←←←▬▬>↓←←←
      ▙▬▟";:RETURN
20412 ? "▛|▜↓←←←|||↓←←←
      ▙V▟";:RETURN
20413 ? "▛▬▜↓←←←<▬▬↓←←←
      ▙▬▟";:RETURN
```

Bernard Oppenheim
Indianapolis, IN

My son, Brett, and I have made a few changes which allow you to pause the play by pressing any key (giving you a breather to think!), and to resume play by pressing the RETURN key:

```
5 POKE 764,255
501 IF PEEK(764)<>255 THEN 5000
5000 SOUND 0,0,0,0
5001 IF PEEK(764)=12 THEN 504
5002 GOTO 5001
```

Bob Hawkins
Pittsburgh, PA

NEW BULLETIN BOARD

I have recently opened a twenty-four-hour, seven-day-a-week bulletin board in Edison, New Jersey. The bulletin board runs under TARI-BOARD, Version 1.4 and the telephone number is (201) 549-7591. Please let your readers know.

Scott Brause
Edison, NJ

There are an estimated 200 Atari-dedicated bulletin boards presently on line around the world. The May issue of ANTIC contains a comprehensive article about bulletin boards and how to use them as well as many phone numbers. —ANTIC ED

MIFFED — 2+

I must lodge a complaint concerning the review of FILEIT—2+ (ANTIC, June '83). The system is billed as a *Financial Database System!* The review says that none of the $50 or less systems support computed fields. The FILEIT—2+ package not only supports computed fields but subtotals and monthly totals as well. The financial programs are the strongest part of FILEIT—2+. Show me another $50 package that can generate a report like FILEIT—2+.

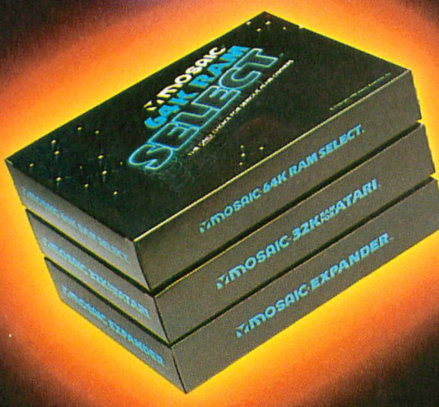
Jerry White
Levittown, NY

continued on page 9

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The mission is patrolled by some pretty nasty security guards riding in elevators throughout each building. You, on the other hand, can carry no weapons if you are to sneak by the mission's metal detectors. After all, you're a spy, not an assassin. Too bad the same isn't true for the guards...

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DEGAUSSING EASTERN FRONT

In response to the May *Photo Fun* contest, the mystery programmer must be Chris Crawford, author of EASTERN FRONT. I noticed that he stores his disks in a flip-n-file next to his television. Isn't it bad practice to store disks so close to the television?

David Stambaugh
Washington, IL

Potential sources of magnetic disturbance should be avoided in areas where disks and tapes are stored. Line scanning for the television picture tube is controlled by powerful magnets at the back of the tube, and in some sets a magnetic field may be generated which extends into the nearby environment. Our own experience indicates that while there may be some risk of data loss, we have yet to scramble disk files due to television set proximity, and we allow a certain casualness. Evidently Crawford, a programmer of some experience, also assumes a comfortably casual attitude. —ANTIC ED

PERCOM DOUBLE DENSITY

Readers who have purchased PERCOM double density disk drives (either single or double sided) and have been limited to using the OSA + 4.0 or OSA + 4.1 operating system to take advantage of the double density capacity of their drives may be interested in a modification to ATARI DOS which I have written. It enables access to all ATARI DOS-compatible files in a double-density context, saves a great deal of RAM, and makes copying from single density to double density disks a breeze. Interested readers may contact me for further information.

Steve Kaufman
BJ Smartware
6507 Bracken Ridge
Cincinnati, OH 45213

REAL COMPUTERS EAT QUICHE

I am a dietician and owner of an ATARI 800 with 48K and a disk drive. Do you know of any programs dealing with dietetics — including programs about the nutritive values of foods, recipe and portion control, food costing, and menu planning?

Beverly Peiss
Oak Park, MI

In the March issue of ANTIC we printed a query about the availability of genealogy software and suggested that readers who knew of such material should write to I/O Board. The response was excellent, and in the May issue we passed these software references on to our readers.

If you, our readers, know of Atari-compatible software which deals with food, menu planning, calorie counting or pricing, please let I/O Board know about it. We will compile a summary list and pass the information back to you in a future issue. —ANTIC ED

LEGAL OR ILLEGAL

I recently purchased the Assembler Editor cartridge for my ATARI, along with the book, *The Atari Assembler*, which has helped me a lot in learning Assembly Language. The book uses the Operating System (OS) subroutine at $F6A4 to print characters to the screen, and mentions that there are many such useful subroutines available in the OS. It would be very helpful if you could name other subroutines.

Paul Shaw (age 14)
San Rafael, CA

The Put Character subroutine that you mention is not a legal Atari ROM vector. Programs that enter the OS at other than officially prescribed locations may not be compatible with future OS upgrades. Much of the software on the 1200XL suffers from this problem. More on this in the future.
—ANTIC ED

BREAK AND SYSTEM RESET

I would like to know how to disable the BREAK and the SYSTEM RESET keys. I am 13 years old and am creating many programs to sell. I would like to prevent consumers from breaking into or altering my programs.

John Trapani
Staten Island, NY

There are many methods and techniques used to "protect" programs. Disabling the BREAK key and forcing SYSTEM RESET to cold start the computer are simple tricks which you can apply to make it difficult for users to LIST your program or accidentally stop its execution as an autorun disk. Beware, however, as users can still LOAD the program and LIST it using DOS! POKE 53774,64 and POKE 16,64 (the shadow register) to disable the BREAK key (do this again after every GRAPHICS mode command). POKE 580,1 to make the computer automatically coldstart when SYSTEM RESET is pressed.
—ANTIC ED

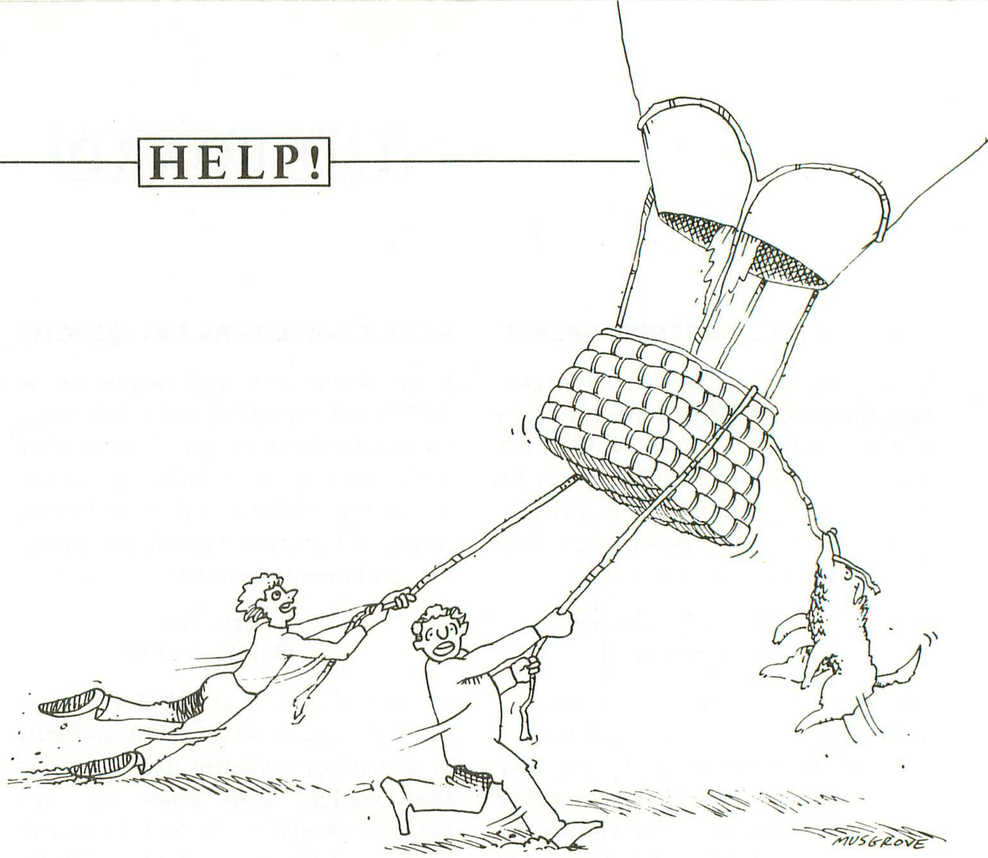
800 VS. 5200

As an Atari computer owner, I enjoy the superb graphics of Atari games. If the 5200 advanced game system is really an Atari computer, can I use game cartridges for the 5200 in my computer?

Chris White
Gretna, LA

No. They don't fit. But more, while similar graphics display technologies are used both in the 400/800 computers and in the 5200 video computer system, there are some major hardware and software differences (such as what happens with joystick signals, essential ingredients to most games). We would suggest that you not run the 5200 cartridge through your band saw to make it fit your computer cartridge slot. —ANTIC ED

HELP!



DON'T DELETE, RENAME!

There is an error in your HELP! section on page 10 of the May 1983 issue, regarding two disk files with the same name. Items 4 and 5 should actually read:

4. Rename the file (DOS option E) and only the first one will be renamed.

5. Go back to BASIC (DOS option B), POKE 3118,184 (back to normal), and all will be well. You will have the two files with different names now on the main disk, with the first file backed up on the second disk.

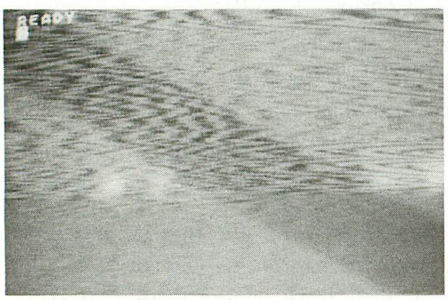
S. Kerner
Van Nuys, CA

MODEMS AND PRINTERS

I need both a modem and a printer. Which printer does good work on business letters *and* graphics? For the modem, I am considering the Hayes. Which software is available for this, that is flexible and easy to use?

Brad Wheeler
Burlington, Ontario,
Canada

The Epson printers use dot-addressable graphics, and produce correspondence-quality text output. We are unaware of the existence of any terminal software especially for the ATARI with the Hayes Smartmodem.—ANTIC ED



INTERFERENCE

I love my ATARI 800, but I'm having a problem with the television screen display *(see photo above)*. I would be grateful for your opinion and possible suggestions for help.

Jeffrey Danley
Deerfield Beach, FL

The RF switchbox which connects your computer to the antenna leads on the back of your television set may be faulty. For replacement, you might consider purchasing a switchbox at your local Radio Shack, or you can order part number CA014746 (T.V. Switch Box) from Atari. —ANTIC ED

CBOOTMGR CORRECTION

In the article "Cbootmgr", printed in the February/March 1983 issue of ANTIC (Volume 1, Issue 6), an incorrect version of the Typo Table was included. This is the correct Typo Table for the first half of the listing, and should be substituted for the table printed on page 80 of #6.

Variable checksum = 120792

Line num range		Code	Length
10 –	49	DO	259
50 –	83	VJ	302
85 –	99	AI	328
200 –	301	YZ	525
302 –	1004	RN	426
1005 –	1090	EC	309
1100 –	2005	JH	300
2006 –	2090	TF	318
2100 –	2110	LZ	24

PROBLEM WITH MINIATERM

The article ATARI TERMINAL in the May issue of ANTIC contained a program, MINIATERM, that probably worked fine for most folks. However, cassette users with 40 or 48K of memory had trouble. Under these conditions, line 30 tries to dimension a string longer than allowed, and causes Error 9. The easy solution is to change the DIM BUFF$(C) in line 30 to DIM BUFF$(32767). A more elegant solution works for any configuration. Take the C=FRE(0)–100 out of line 30, and insert a new line: 25 C=FRE(0)–100:C*(C <=32767)+32767*(C >32767). This sets C to either the maximum available or maximum allowed, whichever is less.

William W. Hough
Wayne, PA

NO QUOTES

Your Tech Tip in the May 1983 issue (p. 97) describes how to examine a disk file using the C (Copy) function. The use of quotation marks around S: or E: as shown in your Tip does not work. When you are prompted "FROM, TO", you should type, as an example, PROGRAM.NAM,E: or PROGRAM.NAM,S:

Angelo Koudounaris
Hermosa Beach, CA

Angelo, you are absolutely right. Our sincere apologies to readers who could not get this to work. —ANTIC ED

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NOTE: Unless otherwise noted, all **OSS** products require 48K and at least one disk drive.

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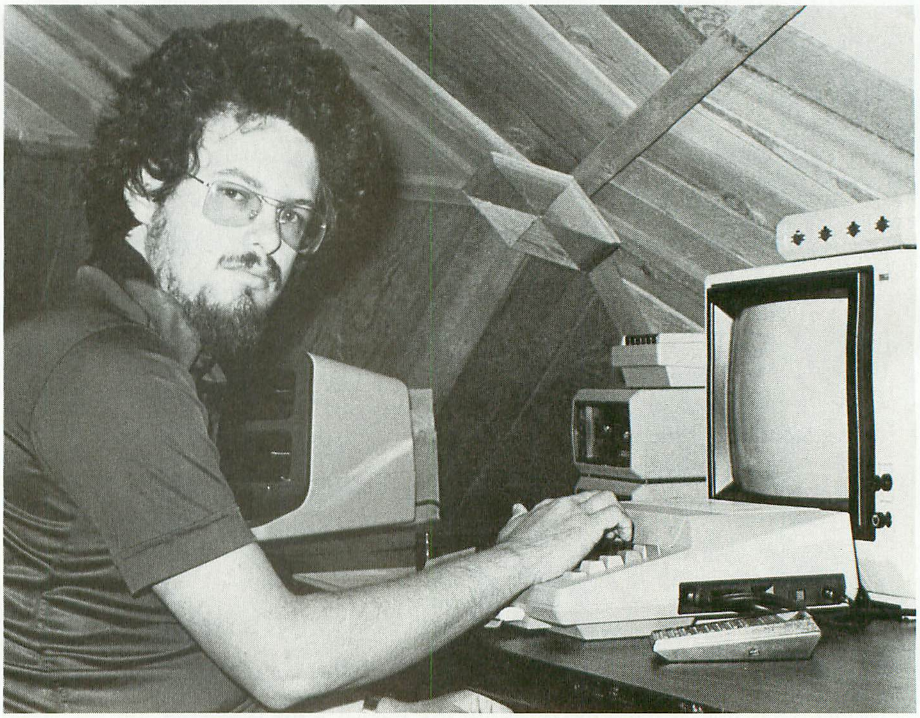
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SCOTT ADAMS

Adventuring with the ATARI

by RON MITCHELL

Science fiction and fantasy buffs who enjoy adventuring by armchair or theater seat can now experience vicarious pleasure more actively at their computers. The computer adventure game offers stimulation for the mind and imagination and its authors are being recognized as creative artists in league with novelists and screenwriters. Scott Adams, president of Adventure International and the author of 13 popular computer adventures, is the most well-known and prolific writer of these adventure games.



Adams began writing adventure games about five years ago, using his TRS-80 Model I in the evenings and on weekends while employed full-time as a computer programmer. It was while he was working for Stromberg-Carlson that he first became familiar with the standard game called "Adventure". One evening after work he watched a co-worker playing the game on the company's mainframe computer. After that he was hooked.

Adams' interest in computers started at a very early age. He remembers a field trip with his third-grade class to the University of Miami. A glass-partitioned computer room that was off-limits to all but the chosen catalyzed Scott's desire to someday be involved with computers.

His first real experience with computers, however, began much later. Adams was in high school when he first started programming. After he graduated in 1970, he attended the local junior college and worked on its computer system between attending classes. Two years later he left school to work as a shipping clerk at the Florida Institute of Technology (FIT). He soon became chief programmer in charge of the school's accounting system. After three years at FIT he got a job as a Space Object Information Analyst at RCA.

RCA transferred Adams to Ascension Island, a communications base off the coast of Africa, where he worked downrange at a remote tracking station. The 35-square-mile island seldom received visitors and he lived in barracks nestled between two heaps of volcanic ash. He applied his programming expertise there by designing a program that drove the radar system.

Adams took a leave of absence from RCA and returned to FIT to complete a B.S. degree in Computer Science. After graduating with honors, RCA sent him back to Ascension Island and later he was transferred to the Cape Kennedy division. Soon he became weary from commuting 60 miles round-trip and found a job closer to home at a small systems programming company in Melbourne, Florida.

While working in Melbourne, Adams met his wife Alexis, who is now the Vice President and General Manager at Adventure International. It was a computer that brought him and his wife together. A psychology major at Miami/Dade Community College, Alexis was involved with a dating service that matched personality types through a computer. Alexis came across the dating data that Adams had submitted, and three months later they were engaged. After

their wedding they moved to central Florida where Adams began to work for Stromberg-Carlson. There he was introduced to adventure games by fellow employees, and soon after began piecing these games together in his spare room.

In 1979 the company moved out of the back room into a retail store called the Adventure International Computer Center, which also sold a complete line of microcomputers and software as well as Adams' games. AI has now expanded to 40 employees and houses its operations in a custom-built geodesic dome in Longwood, Florida. Their annual computer show in February drew a crowd of over 10,000 this year.

ANTIC: When did you invent your first game — Adventureland?

ADAMS: I was working for Stromberg-Carlson as a programmer during the day and on my own time I began writing my first adventure game. My wife, Alexis, was pregnant with our first child then, and I worked on my own home computer in our spare room.

ANTIC: We understand you first became interested in adventure when you saw it played on a mainframe at Stromberg-Carlson. It was called Colossal Caves wasn't it? What piqued your interest?

ADAMS: It was the basic concept underlying adventure games — finding yourself in a situation with only your wits to solve it, not like an arcade game where you have to depend on your reactions. For about a solid week I went to work early and stayed late. I told Alexis that I had a heavy project I was working on, but I was really playing Adventure. I solved the game in about a week and thought it was the greatest game I'd ever played.

ANTIC: When did you decide to start your own company and begin working on games full time?

ADAMS: I was still working for Stromberg-Carlson and I found I couldn't split my time between my employer and my own business. So, I quit my job to devote time to Adventure International. It wasn't an easy decision. We had a new mortgage, the baby had just been born, and we had a lot of expenses.

ANTIC: We understand your company is a family business? How did this come about?

ADAMS: I was spending a lot of time on the computer when I got home from work and Alexis felt she was becoming a computer widow. One afternoon when I returned from work she announced that my entire disk collection had been put into the oven. Fortunately, she hadn't turned it on. Those were the only copies of Adventureland in existence at the time.

Now she is as active in the company as I am, and we both look back on those times and chuckle.

ANTIC: Many of our readers are new to computers and are not familiar with adventure games. What is Scott Adams' definition of adventure games?

ADAMS: An adventure game is where you, as the player, are put into a situation that you know nothing about and from that point you react as you would if it were the real world. You follow commonsense logic and learn the rules of the world that you're in. Using those rules you try to solve problems or accomplish goals.

ANTIC: Would you give us an idea how you develop an adventure game?

ADAMS: First you decide on a basic theme. For example, you decide, "Well, I'd like to do a ghost town adventure." So you sit down and write all the ideas that would go along with the ghost town.

The next step is to decide whether your adventure is to be goal-oriented, mission-oriented, or treasure-oriented. Okay, our ghost town will be treasure-oriented. We'll hide treasure throughout.

Then I start drawing in the landscape. Well, our adventure is a ghost town, and the ghost town has this long narrow street with a bunch of stores on either side. Okay, what type of stores? That's the landscape part.

As I build the landscape up, I'm thinking of the things that would be found in a ghost town — lamps, guns, shovels, telegraph, safe, stuff like that.

ANTIC: One critic of adventure games says that once it has been solved, the game is no longer any fun. How would you answer that criticism?

ADAMS: Some people enjoy playing the games to find out how many different ways they can win. In mission-type adventure games the challenge would be in finding how many different ways they can go through. In a goal-oriented adventure, there might be easier or quicker ways of accomplishing the goal.

All in all, an adventure game is like a book. Some books can be read quickly. An adventure game can take anywhere from a month to a year.

ANTIC: So after your first game, you developed Adventure #2 — Pirates Adventure — with your wife.

ADAMS: Yes, this was the first game that was marketed nationally. We placed a small ad in a computer magazine and orders began to trickle in.

ANTIC: Adventure #3 — Mission Impossible — introduced a "crypto" feature, in which the player has to solve a cypher in order to accomplish something like opening a door. What other adventure game enhancements have you made?

ADAMS: There are different things that I have added to the adventure. One is the idea of a two-part adventure. When the player finishes one adventure the game's not over. The player gets a password in order to start the second part.

An adventure game is where you, as the player, are put into a situation that you know nothing about and from that point you react as you would if it were the real world.

continued on next page

Another new aspect is to use a time element so that things have to occur within a certain time. The Count, which is a Dracula adventure, literally counts one day. In real time you actually have to play it for a couple of days to solve the adventure.

ANTIC: Your own company, as well as others, is introducing graphic adventures. In fact, one company has a game with animation. Are these developments gimmicks, or can we expect to see more of these types of adventures?

ADAMS: Graphics . . . I am definitely in favor of graphics. All of our new games use graphics wherever possible.

The ones I have seen using animation so far are not using heavy animation. Actually, my graphic games (S.A.G.A.) have some pretty good animation as well as pictures.

Today's machines are becoming more powerful and more capable of good graphic adventure games.

ANTIC: What is your opinion of the lazerdisc adventures being explored by David Ahl?

ADAMS: It's a clever idea but hardware-dependent and limited by the cost of the hardware.

ANTIC: What do you see in the future for adventure and adventure-style games?

ADAMS: The future is limited only by the imagination of those writing them and those playing them.

ANTIC: The biographical material we received from your office stated that you began programming while at North Miami Senior High. What first interested you in computer programming?

ADAMS: I don't know. I enjoy computers and the idea of programming a computer and making it run. It's a joy. I find programming very satisfying.

ANTIC: On what machine did you start programming?

ADAMS: It was an IBM terminal on an IBM 360 using APL, a programming language. APL is heavily math-oriented.

ANTIC: What types of programs were you writing then?

ADAMS: Games. The first program I wrote was a standard Tic-Tac-Toe program. Then I did a checkers game.

ANTIC: What was your first micro?

ADAMS: My first micro was a Sphere that I built from a kit. I had the very first order when it first came out. I turned around and designed a graphics board for the computer and sold it back to the company. Later I got the TRS-80 and began writing adventures on it.

ANTIC: What is your personal opinion of the ATARI home computer?

ADAMS: The ATARI is my personal favorite. In my opinion, it is the finest micro available.

ANTIC: Why?

ADAMS: I like the capabilities of the machine. It is well-engineered. The graphics and sound capabilities are excellent. The machine is fairly well thought out. It's well built. The ATARI is the one I use at home.

ANTIC: It's the machine, then, that you use to do your work on?

ADAMS: We have others in our lab, but the ATARI is the one I enjoy most.

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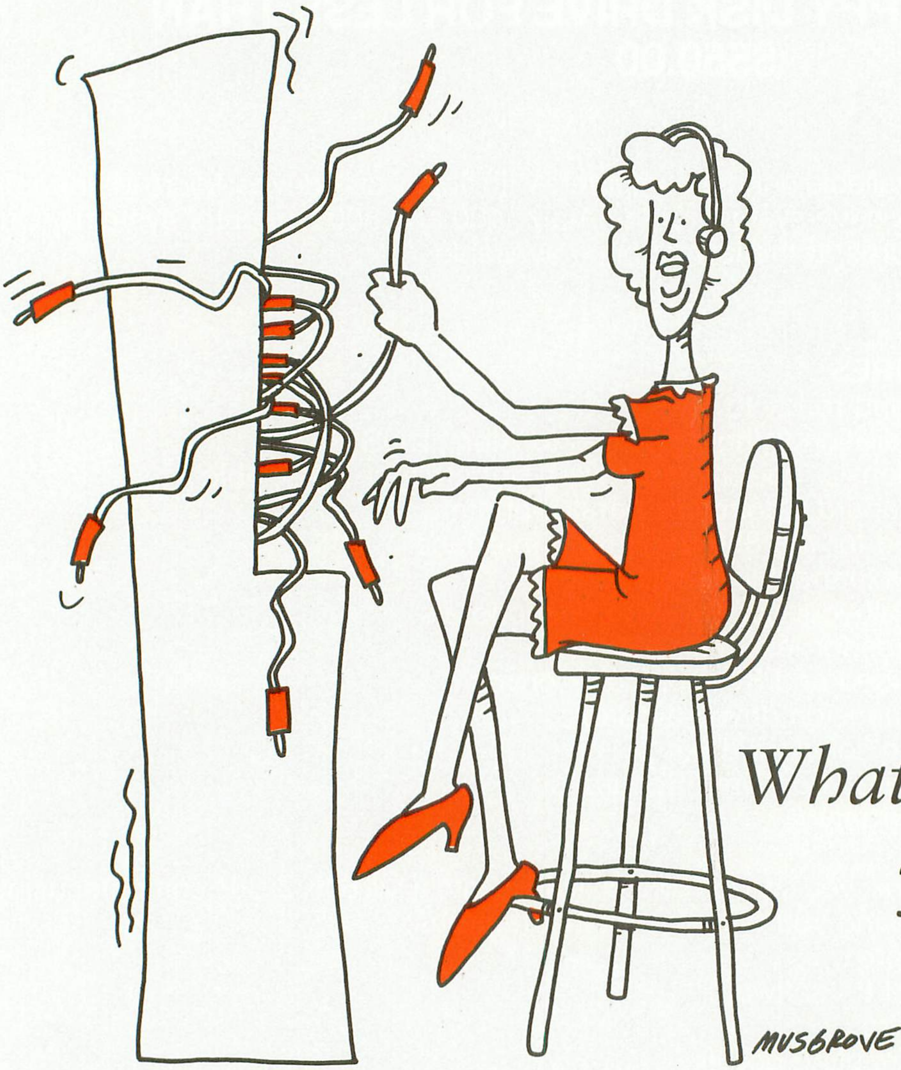
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I/O and YOU

What happens when you press a key

by MARK GRICE

Proposition: After many hours of computer analysis, you have finally succeeded in solving a problem which has troubled the human race for 500 years. Your data might even win you the Nobel Prize. There's just one hitch — *there's no way to save the data!*

Input/Output (often abbreviated I/O) is one of the most important aspects of computing, yet it is one of the last skills a programmer perfects. I think the reason for this is simply that I/O scares people. That's too bad, because I/O is easy to understand.

I/O AND THE COMPUTER:

As a computer goes about its business, you must interrupt it to get it to pay attention to you. Let's look at a simple I/O procedure: Keyboard Input.

Turn on your ATARI and touch a key. Listen closely. Do you hear a click? That click means that an *interrupt* has occurred. You have pressed a key, the computer has recognized that action, and now must respond to it. You have just participated in computer input. Your end of that input is now finished, but for the computer, the whole thing is just beginning.

First, it decides which key has been pressed by scanning its keyboard. This generates a code number for that key. At this point, the computer is ready to proceed, but there is a problem. The number that it has in its hot little hands is *not* a standard code. That number is a special internal keyboard code unique to the ATARI.

So big deal, right? Well, it is a big deal. In order for computers to communicate with each other, some standardization is needed. Also, standardization means that certain peripherals will work with almost any computer. You can imagine how much an Epson printer would cost if Epson had to have a different model for every computer.

The point is that we need a standard, and we have one: the American Standard Code for Information Interchange, ASCII for short. Atari developed its own code, called ATASCII, meaning ATARI ASCII. ATASCII is a superset of ASCII, containing all of the ASCII characters plus extra characters found only on the ATARI.

Let us look once again at the problem our computer faces every time we hit a key. It now knows which key is

continued on page 18

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I/O AND YOU

continued from page 16

involved, but it's not allowed to use the keyboard code to print the character on the screen. So, it hands the keyboard code to the Operating System. The Operating System changes the number to its ATASCII equivalent, and gives it back to our poor distraught computer. *Now* our computer can print the character. It does this each and every time you press a key!

Now let's try to apply this. Every time you hit a key, the *keyboard* code (interrupt value) is placed in memory location 764 (decimal). This is *not* the ATASCII value, it is the *keyboard* value. The computer checks location 764 sixty times per second to determine if a key has been pressed.

This information can be used, for example, to monitor the keyboard for input by a user, as in selection from a menu. We can PEEK(764) to get the code for the most recent keypress, eliminating the need for an INPUT statement and the associated [RETURN]. Here is a quick program to demonstrate this:

```
10 A=PEEK(764)
20 IF A=63 THEN GOTO 100
30 GOTO 10
40 END
100 PRINT "AN 'A' WAS HIT!"
```

Similarly, you could write a game using location 764 instead of joysticks. Enter this short program:

```
10 A=STICK(0)
20 IF A=7 THEN X=X+1
30 IF X>38 THEN X=37
40 IF A=11 THEN X=X-1
50 IF X<1 THEN X=1
60 POSITION X,10: PRINT "0"
70 GOTO 10
```

If the joystick in Port 1 is moved to the right, a string of 0's will be drawn to the right; and if the joystick is moved to the left, a string of 0's is drawn to the left. Now change the program to this:

```
10 A=PEEK(764)
20 IF A=7 THEN X=X+1
30 IF X>38 THEN X=37
40 IF A=6 THEN X=X-1
50 IF X<1 THEN X=X-1
60 POSITION X,10: PRINT "0"
70 POKE 764,255: GOTO 10
80 REM Poking 764,255 clears
   register 764
```

In the second example, the same thing is accomplished with the left and right arrow keys, respectively, without the Control key. I would like to point out to all those who are afraid of Input/Output that the process of reading a joystick is considered to be *input*.

Before we leave location 764, suppose we are writing a program and want to keep unwanted eyes from prying into our files. One obvious way to create a protection scheme is to request the user to INPUT a password and have the program verify the password:

```
5 DIM PASSWORD$(5)
10 PRINT "ENTER PASSWORD"
20 INPUT PASSWORD$
30 IF PASSWORD$="ATARI"
   THEN GOTO 100
40 IF PASSWORD$<>"ATARI"
   THEN GOTO 200
100 REM: Here is the rest of the
    program
150 END
200 PRINT "A SPY! A SPY!"
```

There are better ways. If you really want to restrict access, don't advertise that a password is needed. A person looking over the shoulder of the operator could discover the password. Time again for Agent 764:

```
10 SUM=0
15 GRAPHICS 0: POKE 764,0
20 A=PEEK(764)
25 CODE=224: IF A=B THEN
   GOTO 20
30 SUM=SUM+A
40 IF SUM=CODE THEN
   GOTO 100
50 IF SUM>CODE THEN
   GOTO 200
55 B=A: GOTO 20
100 PRINT "THAT'S RIGHT"
110 POKE 764,255: END
200 SOUND 0,100,8,10: IF PEEK
    (764)=12 THEN GOTO 310
300 GOTO 200
310 SOUND 0,0,0,0: GOTO 10
```

I will briefly explain the above program. Basically, we are adding together all the keyboard codes of the keys that spell the world "ATARI". The sum is 224.

First, we set location 764 to 0. When a key is pressed, it changes the value of 764. We store this new value into our temporary storehouse, A. We add this to our SUM. Now we check it against the final CODE. If SUM is equal to CODE, the operator is either authorized, or very lucky. If SUM is larger, the operator is unauthorized or stupid. Either way, we will act accordingly.

Now we take A and put it into B. Why? Because we are now operating at *machine* speed, not human speed. And before the fastest typist can hit two keys, the computer has checked location 764 about 32 times! Needless to say, that adds up fast. So we check to make sure the value of 764 has changed. Otherwise, we ignore it (IF A=B THEN GOTO 20) and keep checking it until it *does* change. This presents a small problem — you cannot have a password with the same letter used twice in succession, like the password "AAAAY", for example (sorry, Fonz). This is a small disadvantage considering all of the secrecy we gain.

To close this introduction to Input/Output, here is a short program that will show the value that is placed in location 764 by any keypress:

```
10 OPEN #1,4,0,"K:" REM Opens
   IOCB #1 for input from the
   keyboard
20 Y=PEEK(764): IF Y=255
   THEN GOTO 20: REM Check
   for keypress
30 GET #1,X: REM Obtain
   ATASCII value
40 PRINT "YOU PRESSED
   ";CHR$(X);", PEEK(764)= ";Y
50 POKE 764, 255: REM Clear
   register
60 GOTO 20: REM Do it again
```



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E.T. GAME FOR COMPUTERS

Atari adopts America's favorite alien

by ROBERT DeWITT

The tremendous popularity of E.T., the Extraterrestrial, almost guaranteed that an E.T. computer game would appear, and such is the case. **E.T. Phone Home** has been released by Atari for its family of home computers. The product boasts several advances in game design, including a smooth-scrolling playfield, speedy animation of pursuers, and voice synthesis, all accomplished within the confines of a 16K ROM cartridge.

E.T. Phone Home is intended for a young market, but like the film, it may be appreciated by older players as well. The game is simple enough at the lowest level for children "Elliot's" age to play and win, but at level nine it will still challenge experienced stick twisters. The price is $49.95.

The concept of the game derives directly from the E.T. story: E.T., while hiding in the house, guides Elliot around the neighborhood to find pieces for the telephone call needed to call E.T.'s alien friends to return from space. If the pieces can be gathered within the time limit, and E.T. can scurry to the landing site without detection, the spaceship lands and carries him away.

This happy ending for the game was one of the main concerns of Stephen Spielberg, the film's producer, and is somewhat unusual, considering that most computer games have no clear ending but go on indefinitely as long as the player can endure. Spielberg took an active part in the development of the game, approving the concept, implementation and design at several stages.

Atari acquired the E.T. rights at least partly because of Spielberg's fascination with Atari products — all the way from coin-op arcade machines to the ATARI 800, which he owns and uses. One other ingredient was the interest of Steven Ross, Chairman of Warner Communications, in associating E.T. with the Atari label.

Work on the E.T. computer game began in October 1982, according to Chris Horseman, V.P. for Software Engineering with Atari's Home Computer Division. The challenge was to move the project quickly from proposal to market while maintaining qualities required by Spielberg. These included high standards of graphic and sound representation, especially for the E.T. figure and voice, and a natural yet playable game concept that was true to the feeling of the film.

Time was important because Atari hoped to use E.T. Phone Home as a key demonstration product for the new 1200XL computer, that was to be unveiled at the Consumer Electronic Show in Las Vegas last January. Such a short fuse for a major product is practically unheard of, but a playable version was demo-ed at CES. Final playtesting and minor modifications followed.

To meet this schedule, Atari applied the team approach, essentially for the first time with a computer game. Previous Atari game products, while benefitting from the input of various specialists, had been developed by a single programmer. E.T. enjoyed the attentions of graphic artists, play designers, sound engineers, and programmers teamed up under the guidance of the Manager for Entertainment Software Products.

There were more ideas for E.T. than ROM space could handle, according to Horseman, and the finished game represents only about one-fourth of the game scenario considered at different times during development. Even so, the game is elegant and sophisticated in its appearance and play. The playfield scrolls to reveal a suburban neighborhood of streets and houses edged by forests, fields and streams. These elements were constructed from characters carefully redefined so that

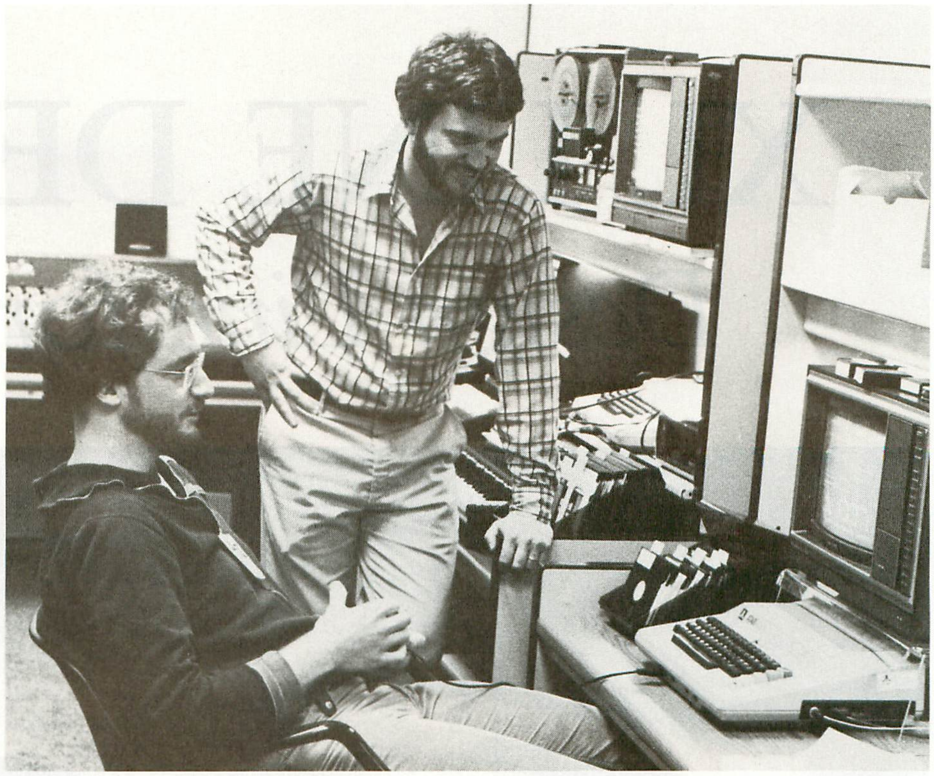
each might contribute to several different final forms.

The "enemy" pursuers in the game are animated, and guided by routines that hunt for Elliot and E.T. under certain circumstances. This contrasts to the usual method of representation where the opponent figures do not change in appearance and move in random or predictable ways. E.T. himself is designed so that he is unmistakably recognizable in appearance and gait, frontally and in profile, even though represented by relatively few pixels on the screen.

Digital synthesis of E.T.'s voice is heard at the point in the game when all the phone pieces have been collected, and although voice synthesis is not new, this is the first it has been incorporated in a ROM game cartridge for these computers. The short phrase "E.T. phone home," required more than 1,000 bytes of memory to accomplish.

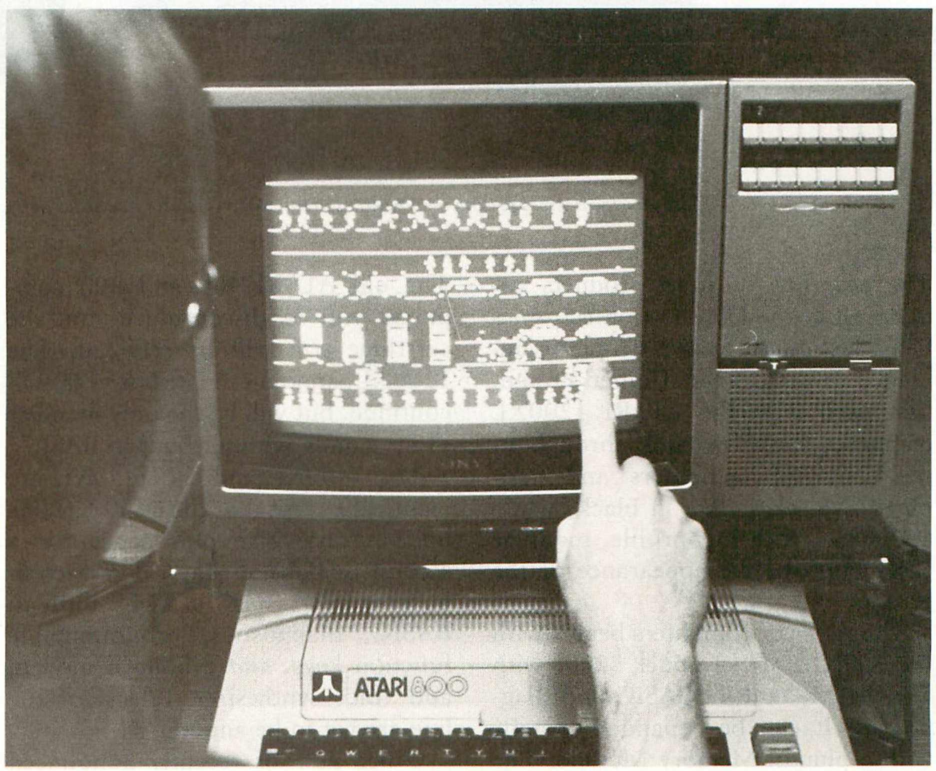
The sound work for E.T. also included music and a tone (representing E.T.'s telepathic signal) that guides Elliot in his search for phone parts. The Atari sound lab is well equipped with instruments and apparatus to create almost any imaginable sounds, but the star performer is a sound-editing program with which you can "draw" the frequency profiles of the four ATARI voices, and then literally "see" what you are hearing. This development tool, and its companion graphics editor are not available to the public.

More than likely we will see more Atari products tied with popular films, TV and cartoon personalities. Projects to create gameware around such properties are underway, but that does not mean an end to original and innovative games like Star Raiders, Pac-Man and Centipede. Atari has set up an Advanced Game Design unit, and according to Horseman is actively seeking game creators who already have some notches on their joystick. Qualified applicants can contact him directly at Atari's Sunnyvale headquarters.



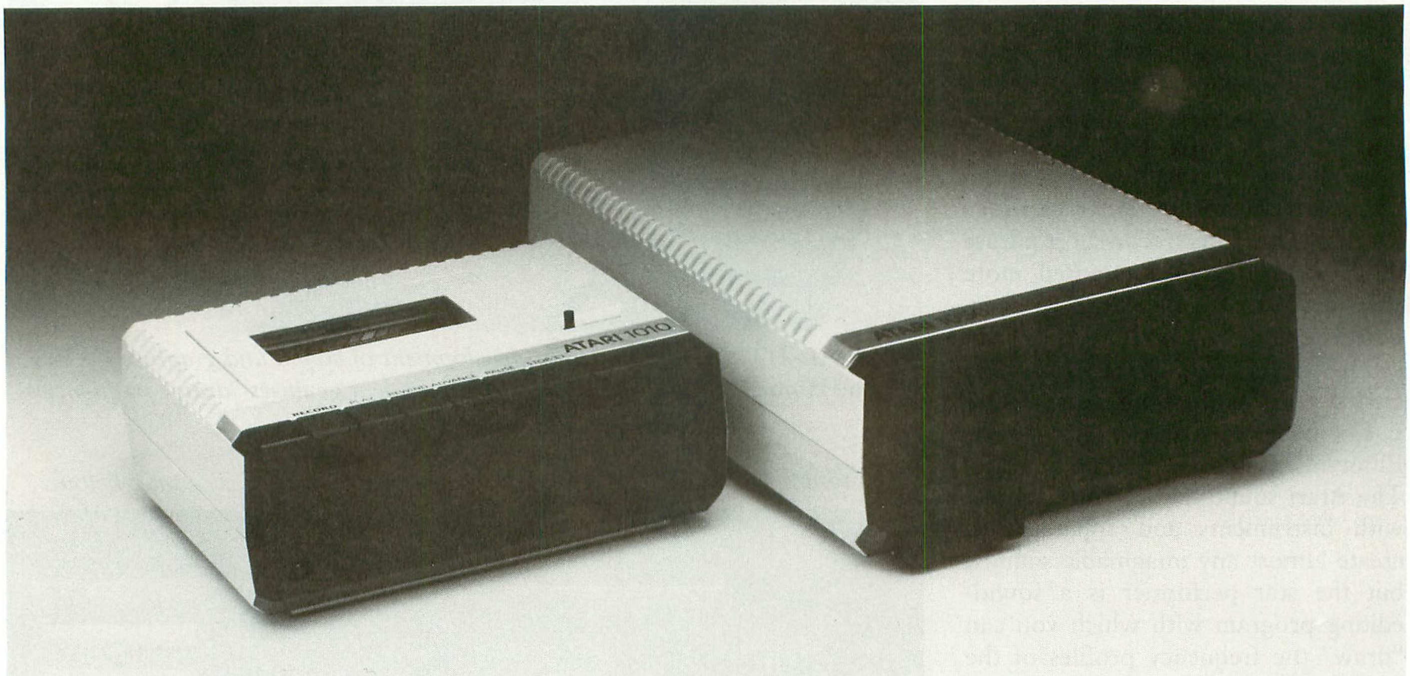
SPECIAL TOOLS contributed to development of sound and graphics for **E.T. Phone Home**. *In Atari audio lab, above, resident geniuses "draw" frequencies on Sound-Editor.*

Graphics Editor displays some images designed for the E.T. game, below.



XL LINE DEBUTS

Design Line for Atari



Mass storage devices for the new Atari systems: 1010 Cassette Recorder (left); and 1050 Disk Drive (right).

The new line of Atari products announced at the Consumer Electronics Show last month bear a strong resemblance to each other. Unified design, first used with the ATARI 1200XL computer, now extends throughout the series of computers and peripherals. Sleek styling in black, white and silver, with low-profile, modular cases improve the appearance of the group.

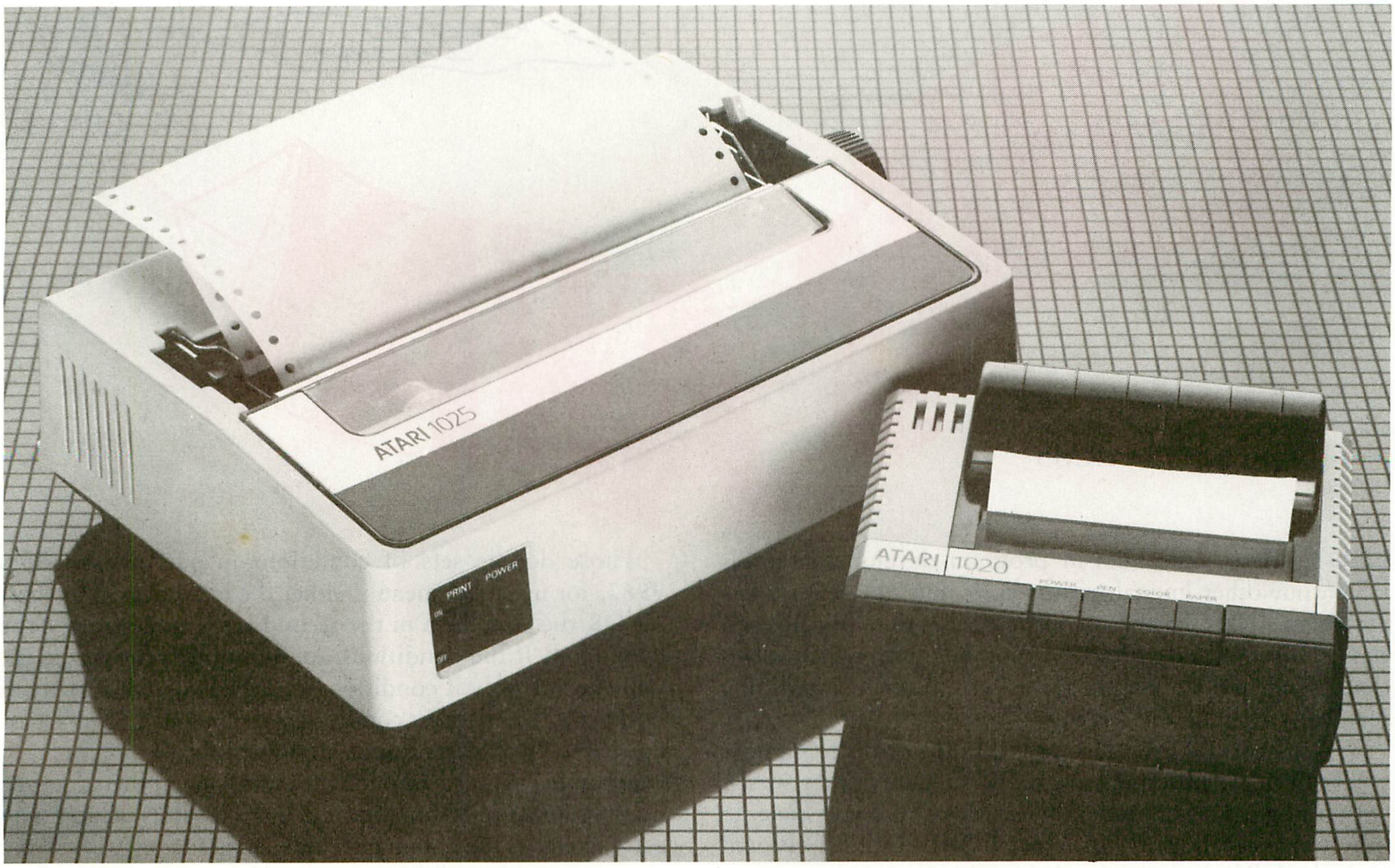
The series of computers begins with the 600XL, priced under $200, with 16K RAM, built-in BASIC and diagnostics. It can be expanded to 64K with a plug-in Memory Module. The 800XL has BASIC and diagnostics, plus a monitor jack and 64K memory. The old ATARI 400 and 800 computers will be discontinued, but the cartridge size will be retained. The 1200XL, announced late last year, will continue, but will be the only member of the family without built-in BASIC.

The 1400XL and the 1450XL are identical except that the 1450 has one built-in disk-drive plus space for a second (expansion bay). These computers have 64K RAM, built-in BASIC, diagnostics, programmable function keys, *and* a built-in modem and voice synthesizer. Prices for the line are yet to be announced.

Other new or recently announced items in the line include the 1010 Cassette Recorder (see Tape Topics this issue for review), the 1020 Color Printer/Plotter, the 1025 80-column dot-matrix printer, the 1027 Letter Quality Printer and the Atari 1050 Disk Drive. The drive, a long-awaited replacement for the 810, will be capable of double-density operation under the new DOS 3.0, to be released later this year.

Of very great interest to the Atari community are the expansion units announced at the CES. One of these will enable CP/M programs for the ATARI; the other will provide eight standard plug-in slots to accomodate third-party products that may enhance the usefulness of the Atari System.

—ANTIC ED



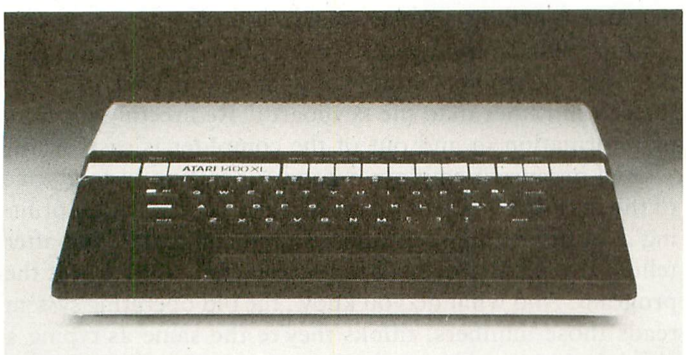
Printers for the Atari system: the 1025 Dot-matrix Printer (left); and the 1020 Color Printer/ Plotter (right).



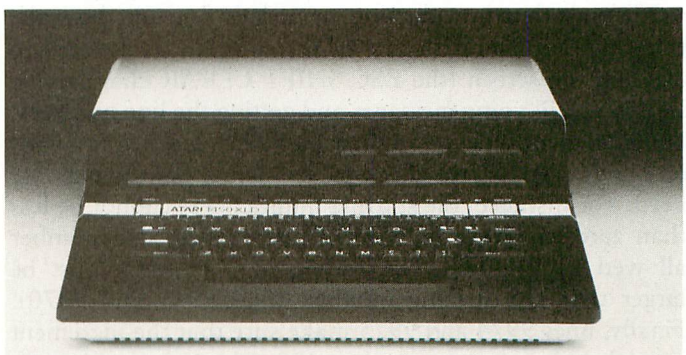
600XL



800XL



1400XL



1450XL

LINES AWAY



by KEN HARMS

PILOT offers some built-in program development tools which our other-lingual friends envy. But one feature I've always missed is the ability to delete more than one line at a time. This month we present a short program which solves that problem and demonstrates yet another interesting feature — reading the screen.

Type in DELETER and save it on tape or disk. Suppose you've been programming away, and suddenly find yourself with a number of unneeded lines. Make sure you have no line numbers above 9950, then LOAD DELETER and issue the following command:

J:*DELETER

You'll be asked to give the starting line number you wish deleted, the ending number, and the increment by which lines are numbered. Enter these, press RETURN and DELETER will erase lines at the rate of 100 per 8 seconds. If lines are numbered unevenly, enter an increment of one and all lines will be deleted. (It may be slightly faster if you RENumber such a program before LOADing DELETER. This puts all lines on the same increment so fewer numbers are deleted.)

When you're all done, SAVE your program without the DELETER lines. See "PILOT Primer", Appendix B, page 151 (disk) or 160 (tape) to find out how to save part of a program.

With all that introduction over, let's find out how the thing works! The first part of the program is devoted to clearing the screen (the ESC-SHIFT-CLEAR character in line 9953), T:yping messages and getting the line numbers, and increment (lines 9954 through 9975). Each time a variable is A:ccepted, we check to see that it fits the data we need. For instance, the starting number (#S) cannot be less than zero or larger than 9999 (the highest line number allowed by PILOT). The ending number (#E) must be larger than the starting number (lines 9969 and 9970). Finally, lines 9974 and 9975 make sure that the increment is not less than 0 or larger than 100. The 100 maximum is arbitrary, you can change it to be anything you wish.

Those double sets of conditions in parentheses (lines 9962, for instance) mean if either the condition in the first set OR the condition in the second set is true, execute the command. If the conditions are multiplied, the statement will execute only if condition one AND condition two are both true. To interpret conditional commands, PILOT first evaluates all the conditions. It substitutes a one for each true condition and a zero for each false one. It then does the math linking the commands and if the result is greater than zero, executes the command. You can get fancy with all the signs (a pair of conditions separated by a minus will execute only if the first is true AND the second is false). Experimentation is the rule.

So on to the fun part. The *PRINTLINES module clears the screen and then prints numbers beginning at the starting number, incremented as directed and ending at the last number to be deleted or after 20 lines have been printed. *DELETE types a J:ump command, then POS:itions the cursor to the top of the screen. Line 9990 is the magic incantation.

In PILOT, values are placed into specific memory locations with the C:@Bn=x command. We read this as "C:ompute at byte n the value x." A byte is computerese for a character. The "n" is the (decimal) address of the byte and "x" is the value we will store in that address. The ATARI uses values at different addresses to control different machine functions such as sounds and colors.

Line 9990 C:omputes a 13 into address 842. The 13 tells the Atari "when you stop, read your next instruction from the screen rather than the keyboard." Redirecting the flow of information in and out of the computer is easy on the ATARI because it employs a good "operating system", one of the first such systems on the market. So, right after printing a set of line numbers and a J:ump command, and after telling the ATARI to read the screen, line 9991 E:nds the program. And what do you know, the old operating system reads those numbers, thinks they're the same as typing a number without a command on the keyboard and erases

continued on page 24

LINES AWAY! *continued from page 24*
each line! When it gets to the bottom of the list it reads a J:*RESTART command and executes it.

Now the first thing *RESTART does is C:ompute a 12 into 842. You're right, the 12 tells the ATARI to turn off the screen reading and start reading the keyboard again. We then check to see if all line numbers have been T:yped and, if not, J:ump to *PRINTLINES to start the procedure all over again.

I left the numbers on the screen to track progress. If you don't like them, you could insert a C:@B instruction to turn the letters blue. Remember to turn the letters on again with another C:@B or a GR:QUIT.

You can get some real fun from the "842 tango" by using it to modify a program while it turns. Say you want to save a person's name in a program. Ask for the name in a T:ype / A:ccept set of statements which puts it into a variable we'll call $INPUTNAME. Then clear the screen, T:ype a C:ompute statement like this:

C:*NAME = $INPUTNAME

Follow this by a J:ump command on the screen, POS:ition the cursor, C:ompute the 13 into 842 and E:nd the program. Remember to use a line number in the compute command but no number on the jump. If you have followed the outline of DELETER for a *RESTART, you can SAVE your new program with the name imbedded in it. I'm sure you'll find other uses for "the magic of the 842."

```
9950 R:PILOT AUTO LINE DELETER
9951 R:ANTIC K. W. HARMS
9952 *DELETER
9953 T:■ [CLEAR SCREEN
9954 POS:2,11
9955 T:     PILOT
   DELETER
9956 *REENTER
9957 T:
9958 T:ENTER LINE NUMBERS TO BE DELETED:
9959 *NEWSTART
9960 T:START       \
9961 A:#S
9962 T(#S<0)+(#S>9999):■ENTER NEW
   START       [■ IS BELL. TYPE ESC,CTRL,2
9963 J(#S<0)+(#S>9999):*NEWSTART
9964 *NEWEND
9965 T:END         \
9966 A:#E
9967 T(#E<0)+(#E>9999):■ENTER NEW END
9968 J(#E<0)+(#E>9999):*NEWEND
9969 T(#S>#E):■START LARGER THAN END
9970 J(#S>#E):*REENTER
9971 *NEWINCREMENT
9972 T:INCREMENT  \
9973 A:#I
9974 T(#I<1)+(#I>100):■ENTER
     NEW INCREMENT
9975 J(#I<1)+(#I>100):*NEWINCREMENT
9976 *PRINTLINES
9977 GR:QUIT
9978 C:#L=0 [Line counter
9979 POS:2,2
9980 *PRINTLOOP
9981 C:#L=#L+1[Increment line counter
9982 T:#S       [Line number to delete
9983 C:#S=#S+#I
9984 J(#S>#E):*DELETE [Job done
9985 J(#L=20):*DELETE [Enough lines
9986 J:*PRINTLOOP
9987 *DELETE
9988 T:J:*RESTART[Command on screen
9989 POS:0,0      [Get to top of screen
9990 C:@B842=13 [Set to read screen
9991 E:           [Stops, gives control
     to the screen reader
9992 *RESTART
9993 C:@B842=12   [Set write to screen
9994 T(#S=#E)+(#S>#E):■■
9995 E(#S=#E)+(#S>#E):
9996 J:*PRINTLINES
9997 R: END OF
     PROGRAM
```

400 UPGRADE

by GEORGE J. ADAMSON

No question about it, the ATARI 400 was, and is, a good little computer. Electronically it is almost identical to the 800, runs the same software, and for its price offers power and features still not fully matched by its competitors. But it does have its problems. Many 400 owners, fond of their machines, have opted to upgrade rather than trade them, and that's what this article is about.

Using add-ons made available by non-Atari companies (often called *third-party vendors*), it is now possible to have an ATARI 400 with a full-stroke keyboard, 50K available RAM, and a monitor jack. This brings the 400 to functional equivalency with the 800, and should satisfy any Atarian who isn't overawed by styling.

By early 1983 the price of the ATARI 400 had fallen to less than that once charged for the VCS game machine. There were, however, still the problems of the monopanel/membrane keyboard and limited memory. Apparently, the designers of the 400 thought the impermeable panel made good sense for use by youngsters, and it probably was cheaper to make. Nevertheless, the membrane is now widely considered to have been a mistake, and virtually all new computers are sporting real keyboards. Certainly any kind of voluminous data entry benefits from full-stroke keys.

The other limitation of the 400 is its memory, originally 8K and later increased to 16K RAM. This memory is built-in, and Atari in effect discouraged owners from increasing RAM with warnings about voiding the warranty, overheating, possible electric shock or damage to other delicate parts if the case were opened. No doubt these warnings were responsible caveats, but they served to keep the 400 owner unnecessarily hobbled if they were heeded.

To the rescue came several third-party vendors with full-stroke keyboards. First came Screen Sonics with its Sidewriter (see ANTIC #5), a detached keyboard of high esthetic and engineering quality, which unfortunately required a fair amount of soldering inside the computer. The keyboard emulated the 800, with the exception of the Atari logo key. The long umbilical gave the owner some of the convenience of other detached keyboards, and the Sidewriter continues to be an attractive, if expensive, upgrade still.

Other companies opted for the simpler fix. In-Home, a Canadian company which first tested its product in England, managed to get its first U.S. shipments into the stores by last Christmas, and met with immediate success. At the nominal cost of $45, the In-Home "B-Keyboard" replaces the membrane, sits inside the 400 housing, and looks like it came from the factory that way. However, five keys had to be relocated to the bottom row.

Although the B-Key takes only a couple of minutes to install, you might

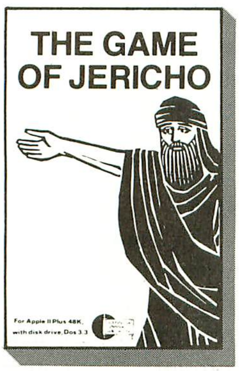
continued on page 30

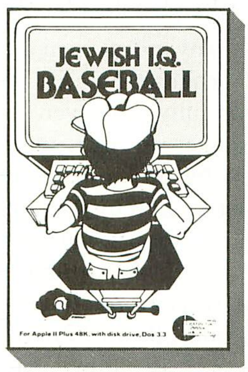


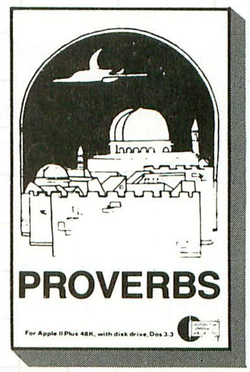
In-Home keyboard compared to ATARI 800 keyboard.

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THE GAME OF JERICHO In this action-packed arcade game, the player directs the blasts from Joshua's shofar to destroy the walls of ancient Jericho. His shots must be quick and accurate to penetrate enemy lines. One must be careful, though—the enemy is constantly raining down clusters of arrows. "Jericho" combines outstanding sound and colorful graphics—but to win, one needs to be cunning, clever, and daring. "Jericho" is for children or adults. **Number 1400 $29.95**

ISRAEL GEOGRAPHY GAME As an "Israel Sherlock Holmes," the player uses historical and geographical "clues" to "deduce" the correct names of sites on the map of Israel. The game begins with a map of Israel drawn on the screen and divided into four regions. The player selects a region and an enlarged map of that section is drawn on the screen. A flashing cursor represents the "target" and the puzzle solving is set in motion. **Number 200-I $25**

PROVERBS Five hundred carefully selected Jewish Proverbs and Folk Sayings, taken from the Talmud, Medieval Hebrew Literature, and Yiddish and Hasidic sources, are presented in this program, indexed by specific categories. To view all the proverbs on any given topic, the user needs simply to type in the category he wishes to see. **Number 600-I $25**

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400 UPGRADE *continued from page 28*

spend a half-hour or so pressing the keys in place and adjusting their movement. Photo 1 juxtaposes the B-Key with the 800 keyboard to show relative size and arrangement.

From Colorado comes the Joytyper 400 at $130. It looks and feels like an 800 keyboard, except that the function keys have been moved next to the spacebar. One needn't relearn any typing skills with this model, but there is a question of esthetics. The Joytyper "sticks" on top of the ATARI case with adhesive pads, and in no way could it be mistaken for a factory model. (see Photo 2).

The newest entries in the keyboard race include the Commander 400, from RCE; the Tara 400; and the Atto-Soft keyboard. The Commander offers custom options, such as numerical keypad, and ranges in price from $109 to $199. It is detachable, like the Sidewriter, but requires no soldering. It can be added to an 800 so that both keyboards are operable at the same time. The Tara 400 fits into the 400 case and boasts gold-plated key contacts. The Atto-Soft costs $90, but we frankly know little else about this keyboard just now.

The other big item in upgrading a 400 is memory expansion. It seems everyone under the sun is making a 48K expansion board for the 400. All these require removal of the original Atari RAM card and replacement with the expansion board. These give the 400 the same amount of usable memory as the standard, fully-equipped 800 —37902 bytes.

Out of this explosion came the first 64K bank-selectable RAM card for the ATARI 400, from Mosaic. This one board has more memory than three built-in boards, and efficiently uses all of the memory available in a 6502 microprocessor. My son wanted to be the "first kid on the block" to have 64K RAM, so he raided his savings to pioneer the Mosaic board. We had some problems, but Mosaic has improved the design and we now believe this is the way to go. Mosaic guarantees all its boards—and lived up to its guarantee in our experience, even though it took three units to do it. The latest (working) unit has Motorola chips rather than the Japanese chips previously used, and perhaps that makes the difference.



ATARI 400 with Joytyper installed.

The Mosaic board uses less current and generates less heat than the original 16K board. The BASIC cartridge isn't "hot" any more, even after several hours of programming. It must be installed carefully, however. The 22-pin power socket in our machine was weakened by all the exchanges, and had to be replaced by a technician. Besides, we had to wait a month to get it.

Was it worth the trouble? The 64K Select board is more efficient than the original, and allows 52K of RAM to be addressed at a time. Mosaic says this means 30% more workspace with the Atari Word Processor and 17% more with Visicalc.

The ATARI 400/800 reserved 16K of addressable RAM for the Operating System and the hardware registers. No doubt you have all seen the "10K ROM Operating System" board in the 800. Hardware consumes another 2K, but that still leaves 4K unaccounted for. Mosaic used this area to create four 4K switchable banks, only one of which is active at a given time. This means that 52K is continuously available, and the balance can be selected in discrete 4K chunks.

The new ATARI 1200XL has something of the same arrangement already built-in, but it has a 14K OS that uses the 4K that was previously extra. However, a 400 with the 64K Select board is even better than a 1200XL in that it has 52K continuous free RAM, and the 1200 must "switch out" its Operating System to get that much. Who among us can write our own OS?

The original 16K Atari RAM board provides 13326 free bytes with BASIC installed. A 32K board boosts usable memory to 29710 bytes. These boards are now cheaper than the ATARI 16K board, and much cheaper than 48K—probably because demand is low for a half-full tank. A 48K board costs twice as much, but boosts memory only 8K to 37902 because BASIC occupies 8K of the top area, no matter what.

Mosaic's 64 Select expands into an area previously "unallocated." It can address 50190 bytes, almost four times as much as the original 16K board. It is more expensive than the 48K boards, but less on a $/byte basis.

By April a third version of Mosaic's expansion board (requiring a third printing of its owners manual, identified on the back cover as No. 229D) was already being shipped. This board eliminates messy soldering to the ROM cartridge socket, works in either a 400 or an 800, and, most pleasantly, carries a $50 price reduction to $199.95.

The newest manual, with almost twice as many pages, offers more photos and even simpler step-by-step instructions for installation in either computer. The computer must be completely disassembled, exercising great care in lifting the 22-pin socket on the power board from its connector.

In its three years of existence, Mosaic has never stopped to relax and admire its work; it wants to be able to maintain its claim that "more Atari owners buy Mosaic memory than any other."

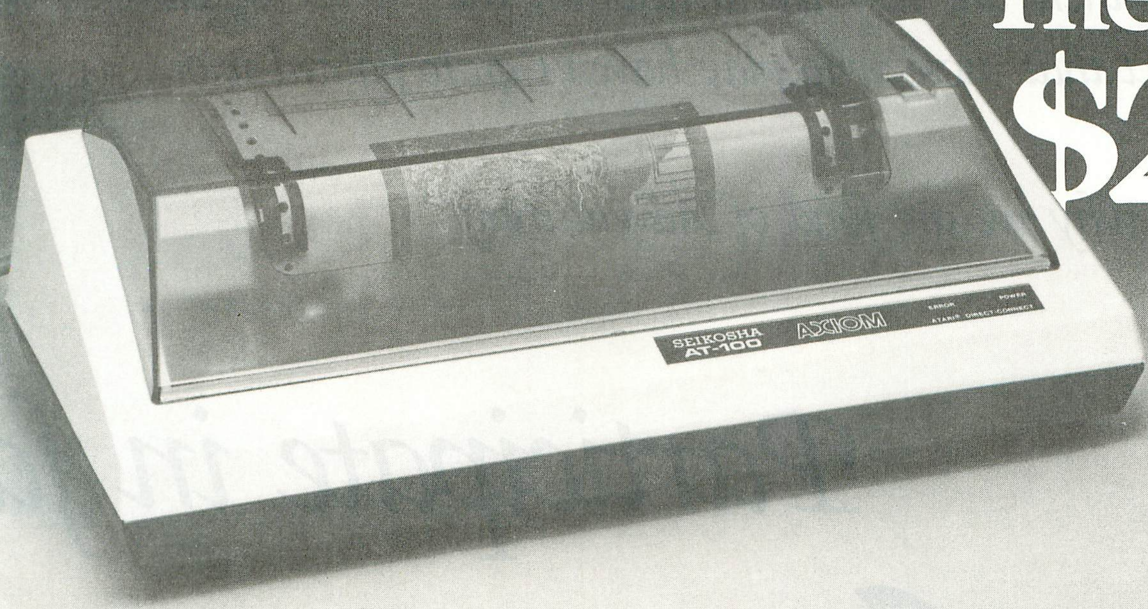
Mosaic is already offering membership in its own users group and even software to take advantage of the 48K memory banks. A package called "Handyman" eliminates the need to type "DOS" and thus preserves more memory for program use.

How did our tale end? In order to avoid "down-time" while waiting for the 400 to be repaired, we traded it on a demonstrator 800. The new 64K board will allow us to put as many as three of them in the 800 slots, creating 196,608 bytes. An 196K ATARI boggles the mind, but then that's another whole story in itself!

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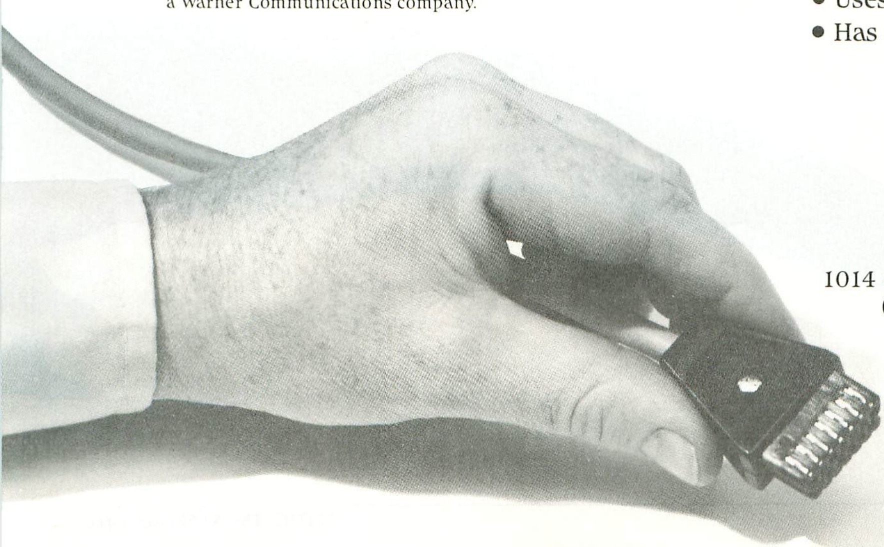
Eight Reasons Why You Need the AT-100

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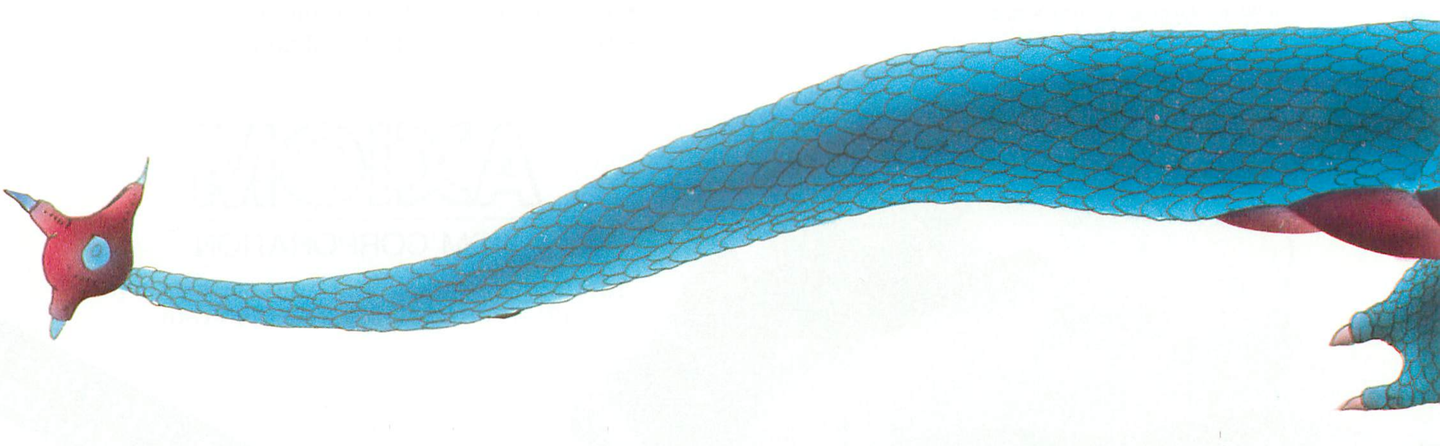
SEE REVIEW IN JULY 1983 ISSUE OF SOFTSIDE MAGAZINE.

This isn't "how" to play Adventures. There seem to be articles ad nauseum on making maps, picking up and dropping items, and so forth. However, there are very few articles on the "why" of Adventuring. (I suspect that those who play haven't quite figured it out for themselves —)

So, here's why we are fond of Adventuring.

Participate in fa

Adventu



ntasy

ring

by DAVE and SANDY SMALL



April 15. Tax time.

Not again! But true, Uncle Sam will be digging into my pockets again. A pile of multi-colored forms lie in front of me, to be filled out on pain of . . . auditing or something worse.

This is adventure? This is excitement?

Highway 183 in Austin, Texas; traffic stacked up in front of me for miles. Smog is filtering in through the air conditioning, with ten more miles until my turnoff.

You call this an adventure?

At the office, it's politics as usual. Did my co-worker really report me in late to my boss? The secretary smiles her cold, professional smile at me as I answer the summons to his office. Maybe I'll get fired.

This is a life? It sure isn't what they promised me when I was young. Back then there were fairy tales and giants and fairy godmothers. But this present unpleasantness does appear to be *reality.* Is this how I'm going to spend my next fifty years?

You have got to be kidding. I am interested in other things. I am going to go battle evil monsters with a magic sword. I am going to rescue fair maidens from their clutches. And I'm going to find loot beyond my wildest dreams, and experience running my hands through chests full of gold coins. That's *my* world, the world I grew up with, the world I wanted, and the world I can't seem to have.

At most, I see only flashes of danger in my everyday life. Possibly a pickup truck will blindside me on the way to work. But in the world I want, danger and the appreciation of life are an everyday thing. Why, to rescue that maiden I'll put it all on the line, every ounce of sinew and wit I possess. There's this troll, see, that weighs four hundred pounds, that guards the entrance to the Great Underground Empire. I'll have to get by him, and the toll for doing so is a life — and should my swordmanship fail me, it'll be mine.

Now if the kind of life I was talking about before appeals to you, if you're into taxes, traffic, and politics, you can forget Adventures. They are not for you. You do not need to escape a reality that is tiresome beyond description. You are probably happy as a clam.

But if you are like me — if you would rather drop you job, car, and co-workers in a second, and try your luck at some real living — then have I got a deal for you. It's simple — a computer adventure.

A computer is a powerful, if simple, machine. It can be instructed to do a number of things, such as payroll checks or word processing. In all of these functions the computer is a powerful tool.

So let's instruct it to maintain a programmed reality, for us to enter. We, as the programmers, control that reality, and once we enter it, must abide by its rules. In the computer's universe, anything goes, and we must be cautious.

Then in this computer universe, we can live as we want to live, and escape the day-to-day realities of life in a universe we were not quite meant for.

Here's some of the more "common" features of some of the computer universes:

† Magic works.
† Unicorns positively abound.
† Trolls are evil and quite deadly.
† Gold, silver, and gems are to be found by the handful.
† Strange forces control your destiny.
† Wizards often cast spells to aid or foil your quest.

Finally, and most importantly, there is a purpose, a set goal. Unlike our reality, which resembles a badly programmed adventure, this new computerized reality gives you a sense of purpose, something great to accomplish. In this universe you can leave your mark on the world. Just for instance, have *you* ever written your name on the rainbow in the sky in this reality? Not many of us leave a mark on the world any more, do we?

You might call all of this "escapist" or "fantasy". True, guilty as charged. But I, and others like myself, need this escape, back to our kind of reality. For us this everyday life is a strange world with strange rules, where our most basic and human needs cannot be satisfied. But in our "escapist" and "fantasy" world, these needs can be. For instance, we can accomplish something with our lives. We can find great treasure, become kings. In a computerized adventure, there are no limits, no discrimination of any sort except the sort imposed by your own wits and daring. You can go as far as you dare to go.

And that is what adventuring is all about. It is about filling the needs we all have in a society increasingly unable to let us fill them.

If you want to come with me to a place and a time where there is a Right and a Wrong . . . if you want to be in a place where there is treasure and

In a computerized adventure, there are no limits, no discrimination of any sort except the sort imposed by your own wits and daring.

Dave & Sandy Small have authored several video and computer games, and own L.E. Systems, manufacturer of programming development tools. Their articles have appeared in several computer publications.

danger . . . then you are a perfect candidate for a computer adventure.

If you are a beginning adventurer, you may be afraid to try your first game. Don't be. It is all quite easy, once you get past the basic step of submerging yourself into this new reality. Live, breathe, think the new reality, and you will go far. The computer will describe to you the situation that your alter-ego, inside the computer, is in. It will tell you of your surroundings and anything else it thinks you should know. Remember, in this universe, the computer is the sole arbitrator of life and death. Here's an example:

"It is dawn. You are lying in a field of green gass, cool to the touch. It is warm, though, and you do not feel chilled. Beside you lies a blade, shimmering as though it is only partly of this universe, and partly of Magic's domain.

In the distance lies a mountain range. You can barely discern the entrance to the dreaded Cave of Unknown Death."

Hot damn! I'm buckling on that sword and going to see what the cave is all about! See you there!

So you type in,

"Get Sword and go to the cave." This tells the computer what you would like your alter-ego to do.

"After some day's journey, you are before the Cave's entrance. It is dark and forbidding. A skeleton lies here, apparently the remains of a previous adventurer. Near the skeleton lies a torch and matches."

Fine — don't want to stumble around in the dark.

"Get matches and torch. Light the torch. Enter the cave."

The computer has the alter-ego do this. The results:

"In the distance your torchlight reveals a slender princess, chained to a well. An ogre lurks nearby; apparently it is planning to have the princess for dinner. Many bones lay nearby. As the ogre sees you, it picks up a gigantic mace and strides toward you, bellowing. Your sword has begun to glow, and upon it, firey letters spell out, 'Thyswand — death to the foul.'"

Time to get that sword out of its sheath, wouldn't you say?

You would perhaps like the names of some really superior adventures? Here are some of the best:

1. ZORK I, II, III. (Play in successive order). This is the best adventure game that I know of.

2. Original Adventure. This is the computer program that started adventuring; it is the first, and still a very good, adventure.

3. StarCross. Can you survive an outer-space encounter with an alien starship?

4. Deadline. Here is your chance to play detective. Solve the murder of poor Mr. Robner . . . and don't get killed yourself.

5. Scott Adam's Adventures 1–12. Twelve great adventures, packed with imagination and a great deal of fun to play. If you are a beginner these are particularly good, as they help you on your way.

6. On-Line Systems "High-Res" Adventures. These are adventures with a new twist — a storybook-like picture at each event. I personally believe that "The Wizard and the Princess" is the best.

Well, that's about it. Which reality you exist in is now a matter of choice; you are not stuck here, you know. If you feel the need, as I do, to go out and slay a dragon or two, instead of finding your thrills with a few more itemized deductions, then by all means try an adventure. It just might scratch an itch — an itch for quest, true adventure — that you may have forgotten you have.

Tonight I'm off to Zork III. I have the wizard's wand, you see, which is quite powerful (if you let it recharge between casting spells). I have a lamp, an Elvish sword "of great antiquity", and my wits. Tonight I'm going to do battle and match wits with the Dungeonmaster himself.

Care to join me?

If you feel the need, as do I, to go out and slay a dragon or two . . . then by all means try an adventure.



UNFAZED BY THE FAZER



There's a hole in the bucket, dear Liza . . .

by TOM KRISCHAN

If and when you get a printer for your ATARI, you will discover one of the inherent problems — you can't use your computer while it is busy feeding characters to the printer, and it can't feed faster than the printer will accept them. If the printer has a "buffer" memory, the computer can feed characters in a flash, but that elegant feature usually costs a lot of money, and some printers don't offer buffer memory at any price.

Microfazer, by the Quadram Corp., is a data buffer that will plug into most printers, and costs $160 for 8K of buffer space. That's probably enough memory for most users, but if more buffer is needed, Microfazer can be upgraded incrementally to a maximum of 64K for $300.

Several months ago I got a 64K model for my Epson MX-80 F/T printer (connected to my ATARI 800). My experience with the Microfazer may be useful to those of you contemplating a similar purchase, and informative for you who are not.

Versions are available in parallel in / out, serial in / out, parallel in / serial out, and serial in / parallel out. The standard printer parallel interface is the Centronics-style (8 bit), and the serial equivalent is the RS-232-C. A special version of the parallel in / out interface was designed specifically for the Epson printer. Microfazer receives data from the computer, stores this data in its own memory, and transfers it to the printer as the printer can handle it.

Printing is still limited by the mechanical speed of the printer, but the printer no longer ties up the computer. As soon as the computer can transfer the data to the buffer, the computer can turn to other tasks while the printer is processing the data stored in the buffer. Real time savings would occur during word processing, payroll, accounting, VisiCalc models, program listings and graphic dumps.

The buffer is limited in two respects. First, it can receive data at a maximum rate of 4000 characters per second. This rate is sufficiently higher than the transfer rate of most personal computers. Second, the buffer is limited by the amount of internal memory available for buffering. The standard Microfazer comes with 8K, with additional memory available to a maximum of 64K per Microfazer. Several Microfazers may be chained together for still greater memory. Neither of these limitations pose any serious obstacles for the typical user.

Microfazer installs easily to a printer. Simply remove the existing printer cable, attach it to Microfazer and attach a second cable from the Microfazer to the printer. Connect the power supply cord and you're all set. Microfazer requires no instructions from the computer, is removable and can be attached to new equipment. The Epson version plugs directly onto the back of the pritner (no second cable) and draws its power through the input port (no external power supply).

My Microfazer came with a 16-page manual and a one-year limited warranty. Quadram says that installation can be completed in less than 60 seconds. Using the internal power and direct connection of the Epson printer-input port also meant no additional cords to become tangled in my already hopeless mess. The connection of the unit seemed so obvious that I had to force myself to read the manual, which was well written and described all of the features of the unit.

Microfazer receives data from the computer at up to 4000 characters per second, has a LED ready light, a manual reset button, and even details on how to do the necessary Epson soldering. SOLDERING!!! The manual

SOLDERING!!! The manual fell from my hands as I rushed over to the magazine rack to review the advertisement. The ad said "powered by the printer or an inexpensive external AC adapter".

fell from my hands as I rushed over to the magazine rack to review the advertisement. The ad said "powered by the printer or an inexpensive external AC adapter". *Nowhere does it mention soldering — not exactly truth in advertising*, I whispered to myself. After I cooled down, I decided to give the soldering job a try. After all, I could always order the external power supply.

Space does not permit a blow-by-blow of this procedure. Suffice it to say I got it done. I then replaced the cover back on Microfazer . . . and it doesn't fit! The Epson's printer case prevents the cover from sliding on. It catches on an edge. I got around this by using a round file to file a groove into the cover.

Microfazer acts like a water barrel with a hole in it. For every seven buckets of water that we pour into the barrell one bucket runs out of the hole.

Power up the printer, and if the red LED lights up, it works. My first attempt failed because of poor soldering. Eventually I got the light to go on. Place the printer back on the shelf . . . and it doesn't sit flat! The printer sits on the Microfazer rather than the Epson's rubber footed base. I solved this problem by installing taller rubber "feet" on the base of the Epson. Finally, the installation was complete — three hours and 15 minutes from when I first opened the box.

Quadram claimed that the Microfazer would receive data from the computer at up to 4000 characters per second. I had no idea at what rate my ATARI 800 could dump data. So, I decided to conduct a little bench mark test using the printer option on my Letter Perfect word processor. I selected two files, loaded each into the computer, sent them to the printer and recorded the Microfazer dump time and total Epson printing time. I ran these tests in triplicate and have listed the results in Table 1.

Table 1. Bench Mark Test

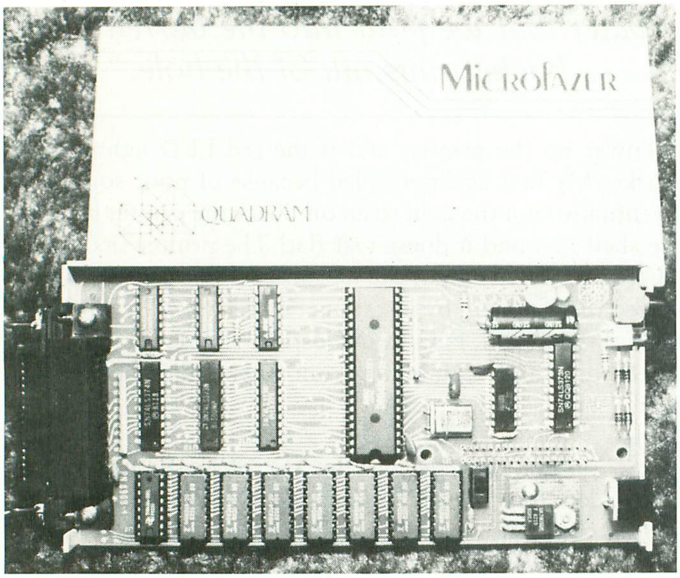
LETTER PERFECT FILE SIZE	ATARI TO MICROFAZER	EPSON PRINT TIME
65 sectors	30 sec	245 sec
102 sectors	57 sec	395 sec

The first Letter Perfect file resided in 65 diskette sectors. The file was loaded into the ATARI and then sent to the printer. When the last byte of data was sent to the printer, a new screen was displayed. This signaled the end of my first measurement. Sixty-five sectors take 30 seconds to transfer from the ATARI computer to the Microfazer buffer. The Epson printer remained active for 245 seconds. The second file resided in 102 sectors, took 57 seconds to dump to the buffer and remained actively printing for 395 seconds.

Each sector contains 128 bytes: 125 bytes are actual data and three are used for file information. Therefore, 65 sectors are equivalent to 8320 bytes, and 102 sectors are equivalent to 13056 bytes. This is a transfer of 277 and 229 bytes per second, and a printing rate of 40 and 33 bytes per second, respectively. (These are rough estimates because of control characters). It is obvious that the transfer rate from the ATARI is much slower than the speed capacity of the buffer. In other words, the bottleneck of my system is no longer the printer, it's the computer. Also obvious is that the

continued on next page

Microfazer receives data from the computer, stores this data in its own memory, and transfers it to the printer as the printer can handle it.

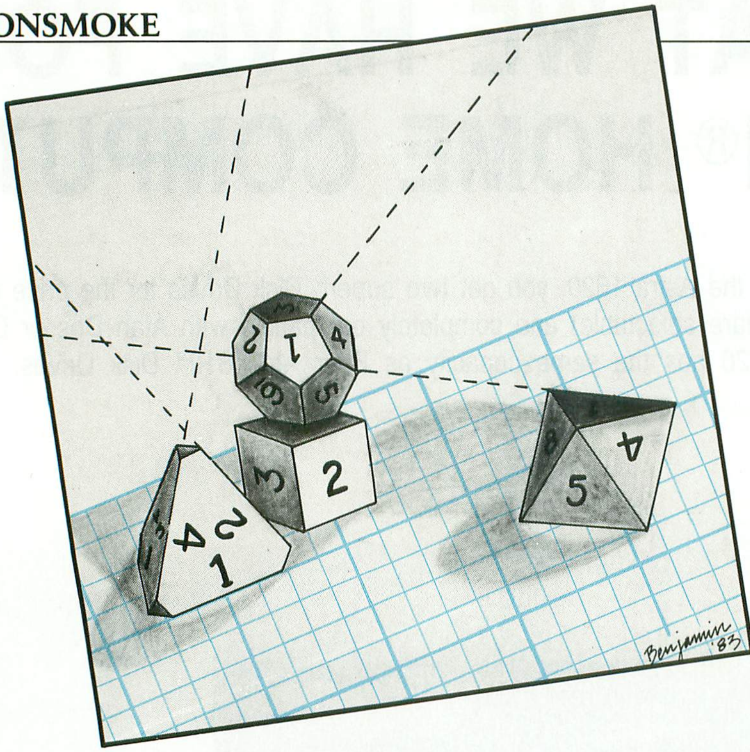


print rate is much slower than the ATARI transfer rate (277 / 40 and 229 / 33). Microfazer acts like a water barrel with a hole in it. For every seven buckets of water we pour into the barrel one bucket runs out of the hole. Gradually, the barrel fills to capacity and then overflows.

I was able to load my largest file five and one half times before the Microfazer reached capacity. In 314 seconds, I was able to send approximately 71,906 bytes to the Microfazer before the buffer overflowed. During this period, the Epson printed approximately 10,362 characters. According to my calculations, the buffer must have contained about 61,544 bytes when it overflowed. This is about right for a 64K buffer, so our bench test is fairly accurate.

A full buffer would take about 31 minutes to print out. In other words, a 36-minute computer task now takes only five minutes. Consider the possibilities of using Quadram's largest Microfazer model (512K) to it's capacity. In 40 minutes you could generate nearly five hours of continuous printing.

Consequently, I highly recommend this product to those who use their printer frequently for large printer tasks. I also suggest that anyone who wants to avoid soldering, filing and refitting the "feet" on their printer base, also purchase the external power supply and the buffer-to-printer cable.



NICE DICE

by BOB ALBRECHT and GEORGE FIREDRAKE

DragonSmoke *poses problems for you to ponder, questions for you to answer, programs for you to write, and other mischief for you to create.*

Game Master's Apprentice

In fantasy role-playing games, names are important. If you read fantasy, perhaps you know some of these names.

FRODO	GANDALF	ARAGORN	GIMLI
ELROND	CONAN	ELRIC	GED

If you acquire a character to play in a game, you usually get to choose the name of your character. You may choose any name, including your own name or the name of a friend. Any name is okay.

You might want to give a character a name different from the names you are used to, a name that "sounds like" the kind of being (human or otherwise) your character is. Or, use your ATARI to create *random* names.

When you see or hear:

ROKAR BARAK KUMAN MORAB

What do you think about them? What kind of characters might they be? How about:

LOSAS SOMAL RAMOS MIKOS

Without any additional information, pick three of the above as people to go adventuring with.

All of the above names have the form:

CONSONANT VOWEL CONSONANT
VOWEL CONSONANT

We challenge you to write a program to create and display five-letter names consisting of: CONSONANT, VOWEL, CONSONANT, VOWEL, CONSONANT. We suggest your program should display several names, then say "FOR MORE NAMES, PRESS SPACE". If someone presses the space bar, you see one more line of names.

Think ahead. Anticipate what we might ask next. For example:

NAME STRUCTURE? CVCVC — Consonant, Vowel, Consonant, Vowel, Consonant.
HOW MANY NAMES? 20

20 names
printed here

TO DO AGAIN, PRESS SPACE

We write down any names we want to remember, then press the space bar.

NAME STRUCTURE? VCCVC — Vowel, Consonant, Consonant, Vowel, Consonant.
HOW MANY NAMES? 16

16 names appear
on the screen.

TO DO AGAIN, PRESS SPACE

This time, names such as ELRIC, ALKAR, etc. are *possible*. But don't limit your program to names with five letters. When the computer asks NAME STRUCTURE?, try VCCVCC or CVCVCV or CVCVCCVC or whatever *you* want.

continued on page 42

NICE DICE *continued from page 40*

Game Master's Dice

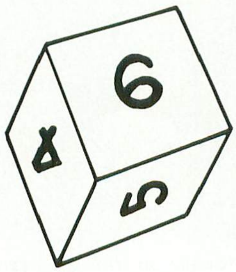
Most-role playing game systems use dice to determine the outcomes of events. Dice are rolled to find out whether something happened or didn't happen. Did a character find the hidden treasure, or open the secret door, or hear the monster sneaking up behind her? Did the character solve the puzzle that unlocks the magic chest or read the cryptic runes? Who won the melee between the good guys and the bad guys? How much damage did our character take when he fell out of the tree? Roll dice to find out.

Dice are used to determine success or failure in using weapons. If a weapon attack is successful, dice are used to determine how much damage is inflicted. If a character can use magic, dice are rolled to determine if a spell is cast successfully and what its effect are. In playing a game, you spend much time rolling dice and interpreting the results of a roll. Fantasy role playing, like life itself, is part skill and part luck.

GAME MASTER'S DICE come in many shapes, from tetrahedrons (4 sides) to icosahedrons (20 sides). We assume you are already acquainted with ordinary six-sided dice. We use the abbreviation D6 to mean one six-sided die.

D6 is one six-sided die
1D6 is one six-sided die
2D6 are two six-sided dice
3D6 are three six-sided dice
and so on.

D6



We use a digit die (DD) to roll a *decimal digit* from 0 to 9. However, sometimes we want to roll D10, a number from 1 to 10. Easy — roll a DD and use 0 to mean 10.

REMEMBER: A *digit die* (DD) is a 10 or 20-sided die whose faces are numbered 0 to 9.

D100 is a *percentage* roll, also called a *percentile* roll, with numbers from 00 to 99. To make a percentage roll, use a DD (digit die), roll it twice. The first roll is the *ten's* digit; the second roll is the *one's* digit. If you roll a 3 the first time and a 7 the second time, the number is 37.

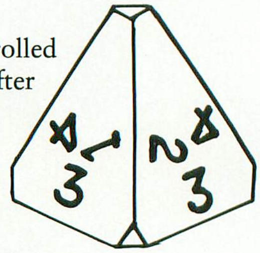
Or use two digit dice of different colors. One color (silver? gold? yellow?) is the ten's digit and the other (white? copper?) is the one's digit.

Sometimes, zero zero (00) is a *fumble*. If you roll a fumble . . . alas . . . your character may trip on his sword, drop the chest of gold on his foot, fall out of the tree in which he is hiding, or suffer another calamity gleefully prescribed by the GAME MASTER. (GAME MASTERS love it when *you* fumble.)

We also use less familiar dice, such as:

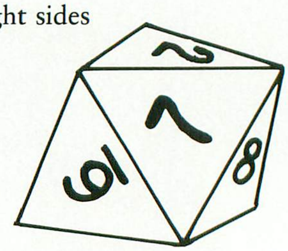
D4 is a tetrahedron, with sides numbered 1 to 4. The number rolled is the one that is right side up after you throw the die.

D4



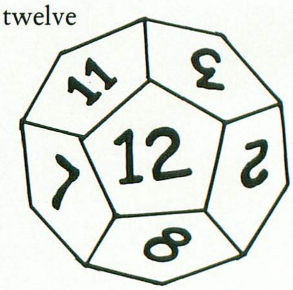
D8 is an octahedron, with eight sides numbered 1 to 8.

D8



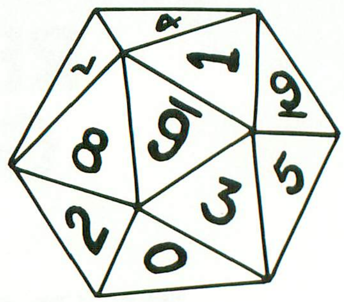
D12 is a dodecahedron, with twelve sides numbered 1 to 12.

D12



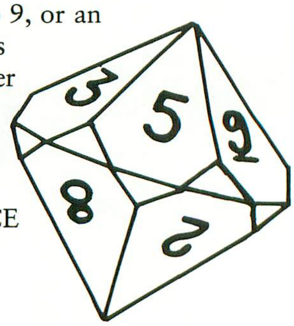
D20 is an icosahedron, with twenty sides numbered 1 to 20.

20



A *digit die* (DD) can be a ten-sided die, with sides numbered 0 to 9, or an icosahedron with twenty sides numbered 0 to 9 (each number appears twice).

DIGIT DICE



If you browse the literature of role-playing games, you may encounter other dice abbreviations.

D3 — Roll a D6 and read the results as follows:

1 or 2 is 1
3 or 4 is 2
5 or 6 is 3

The *possible values* for D3 are 1, 2, or 3.

D6 + 1 — Roll a D6 and add one to the result. Possible values are 2 to 7 (2, 3, 4, 5, 6, or 7).

3D4 — Roll three four-sided dice and add them. Possible values are 3 to 12. These values are not equally probable.

D6 + D4 — Roll one D6 and one D4, then add the results. Possible values are 2 to 10.

Another way to roll D3 is to roll D4. If you get 4, ignore it and roll again. If you don't have the proper dice, improvise!

Or, use your ATARI to roll dice. First, we challenge you to write a program to roll N dice, each with S sides. Yes, if you want, you can roll two-sided dice, or even seven-sided dice, or 13-sided dice, or whatever imaginary dice *you* create. Hmmm . . . if you do, think about what they may look like. Send us our designs for *fair* dice with 2, 7, 13, (and so on) sides.

Yup, we wrote a program to roll dice. Here is a RUN of our program.

```
DICE? 3D6
  12

DICE? 2D7
  6

DICE? DD
  4

DICE? P
  73

DICE? (Same as 1D20)
  16

DICE? and so on.
```

We used DD to mean "Digit Die." We used P to mean "Percentile" roll.

Next time, we will show you our first GAME MASTER'S DICE program. In the meantime, keep on rolling.

Positive, Negative, or Zero

Here again is our simple program to tell whether a number is positive, negative, or zero.

```
100 REM ** POSITIVE, NEGATIVE, OR ZERO
110 DIM YN$(15), N$(8), Z$(4), P$(8)
120 YN$ = "YOUR NUMBER IS "
130 N$ = "NEGATIVE"
140 Z$ = "ZERO"
150 P$ = "POSITIVE"

200 REM ** TELL WHAT TO DO
210 PRINT CHR$(125)
220 PRINT "ENTER A NUMBER AND I'LL TELL"
230 PRINT "YOU WHETHER YOUR NUMBER IS"
240 PRINT "POSITIVE, NEGATIVE, OR ZERO."

300 REM ** ASK FOR A NUMBER
310 PRINT
320 PRINT "YOUR NUMBER";: INPUT X

400 REM ** TELL ABOUT NUMBER
410 IF X<0 THEN PRINT YN$; N$
420 IF X=0 THEN PRINT YN$; Z$
430 IF X>0 THEN PRINT YN$; P$

500 REM ** GO FOR ANOTHER NUMBER
510 GOTO 310
```

Last time we asked you to rewrite the program without using IF statements. Here are two ways in which only block 400 is changed and block 500 is deleted. Blocks 100, 200, and 300 remain unchanged.

```
METHOD #2
400 REM ** TELL ABOUT NUMBER
410 W = SGN(X) + 2
420 ON W GOTO 430, 440, 450
430 PRINT YN$; N$: GOTO 310
440 PRINT YN$; Z$: GOTO 310
450 PRINT YN$; P$: GOTO 310
```

```
METHOD #3
400 REM ** TELL ABOUT NUMBER
410 W = SGN(X) + 2
420 ON W GOSUB 440, 450, 460
430 GOTO 310
440 PRINT YN$; N$: RETURN
450 PRINT YN$; Z$: RETURN
460 PRINT YN$; P$: RETURN
```

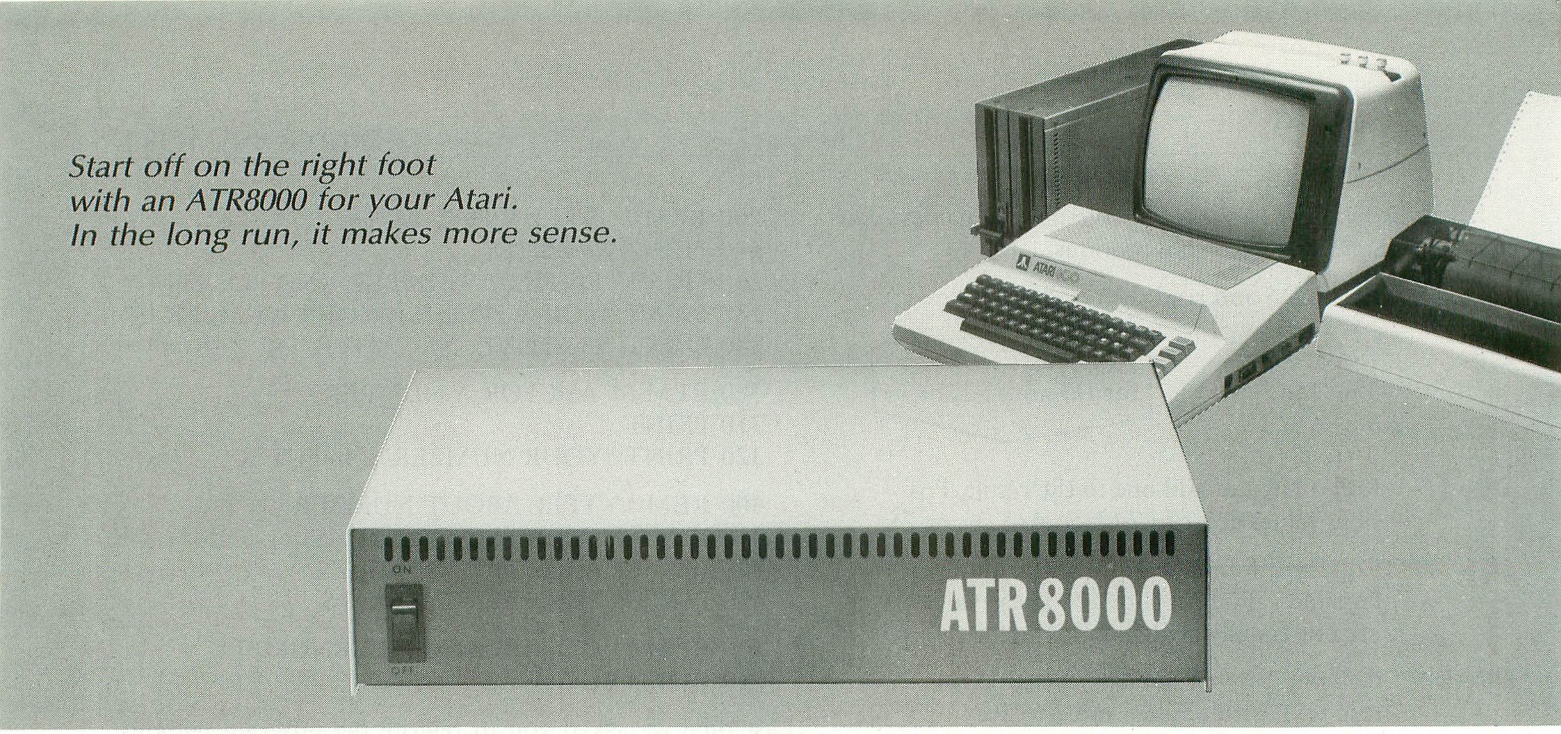
For both of the above, lines 500 and 510 of the original program are unnecessary — delete them.

We have three ways to write this program. Now, without using IF statements or ON . . . GOTO or ON . . . GOSUB, you write block 400 to complete the fourth program.

```
METHOD #4
100 REM ** POSITIVE, NEGATIVE, OR ZERO
110 DIM YN$(15), NZP$(24)
120 YN$ = "YOUR NUMBER IS "
130 NZP$ = "NEGATIVEZERO    POSITIVE"

200 REM ** TELL WHAT TO DO
210 PRINT CHR$(125)
220 PRINT "ENTER A NUMBER AND I'LL TELL"
230 PRINT "YOU WHETHER YOUR NUMBER IS"
240 PRINT "POSITIVE, NEGATIVE, OR ZERO."
```

continued on page 45



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Like the ATR8000, CO-POWER-88 comes with comprehensive documentation. Prices begin at $749.95 with 128 Kbytes of RAM and CP/M-86 operating system.

NICE DICE *continued from page 43*

```
300 REM ** ASK FOR A NUMBER
310 PRINT
320 PRINT "YOUR NUMBER";: INPUT X

400 REM ** TELL ABOUT NUMBER
```

You do this.

```
500 REM ** GO FOR ANOTHER NUMBER
510 GOTO 310
```

Hint: In line 130, NEGATIVE is in character positions 1 through 8 of the string NZP$. ZERO plus four spaces is in positions 9 through 16. POSITIVE is in positions 17 through 24.

Now suppose we change block 100, as follows:

```
METHOD #5
100 REM ** POSITIVE, NEGATIVE, OR ZERO
110 DIM YN$(15), NZP$(8)
120 YN$ = "YOUR NUMBER IS "
130 DATA NEGATIVE
140 DATA ZERO
150 DATA POSITIVE
```

Rewrite block 400 to use the above information. Hmmm . . . five ways so far, more to come later. We will also show some solutions in Atari Microsoft BASIC.

Two-Digit Number Splitter

Last time we asked you to "split" a two-digit number and print the digits separately, like this:

```
TWO-DIGIT NUMBER? 23
TENS DIGIT = 2
ONES DIGIT = 3

TWO-DIGIT NUMBER? etc.
```

We defined a two-digit number as a whole number in the range 10 to 99, inclusive.

Our first solution uses arithmetic to compute the ones digit. It is similar to doing it by long division.

```
      1 ◄ Tens digit           2 ◄ Tens digit
10 | 10                  10 | 23
     10                       20
      0 ◄ Ones digit           3 ◄ Ones digit

      3 ◄ Tens digit           9 ◄ Tens digit
10 | 37                  10 | 99
     30                       90
      7 ◄ Ones digit           9 ◄ Ones digit
```

Let's see now. First, we divide our two-digit number by 10. The whole number quotient is the tens digit. Then, we multiply the tens digit by 10 and subtract it from the two-digit number. The result is the ones digit. In the following program, we use T for the tens digit and U for the ones digit. We don't use O (Oh) because it looks too much like zero (0).

```
100 REM ** TWO-DIGIT NUMBER SPLITTER
110 DIM OOP$(32)
120 OOP$ = "MUST BE A WHOLE NUMBER,
    10 TO 99"

200 REM ** CLEAR THE SCREEN
210 PRINT CHR$(125)

300 REM ** ASK FOR 2-DIGIT NUMBER, X
310 PRINT
320 PRINT "TWO-DIGIT NUMBER, PLEASE";
    INPUT X

400 REM ** IF NUMBER IS OK, GO ON
410 IF INT(X)=X AND X   =10 AND X   =99
    THEN 510
420 PRINT OOP$: GOTO 310

500 REM ** SPLIT THE NUMBER
510 T = INT(X/10)
520 U = X - 10*U

600 REM ** PRINT THE DIGITS
610 PRINT "TENS DIGIT = "; T
620 PRINT "ONES DIGIT = "; U

700 REM ** DO IT AGAIN
710 GOTO 310
```

It seems that a simple thing for a person is difficult for a computer! After all, anyone can look at 37 and tell you immediately that the tens digit is 3 and the ones digit is 7. How? By relative *position* in the number. The 3 is to the *left* of the 7 which, of course, is to the *right* of the 3. Or, look at 88. The left 8 is the tens digit; the 8 on the right is the ones digit.

Let's teach our ATARI to "think" that way. First, we will do it, then try to explain it. Rewrite blocks 500 and 600, as follows.

```
500 REM ** SPLIT THE NUMBER
510 X$ = STR$(X)
520 T$ = X$(1,1)
530 U$ = X$(2,2)

600 REM ** PRINT THE DIGITS
610 PRINT "TENS DIGIT = "; T$
620 PRINT "ONES DIGIT = "; U$
```

Also change line 110 like this:

```
110 DIM OOP$(32), X$(2), T$(1), U$(1)
```

Okay, for those of you who are not used to working with string functions, here is how it goes.

- First, remember that X is a two-digit number. It is positive and has a tens digit and a ones digit.

continued on next page

- In line 510, the STR$ function creates a string two characters long consisting of the tens digit of X and the ones digit of X. For example, suppose X is 37. Then,

  X$ = STR$(X) = STR$(37) = "37"

- Line 520 picks out the first character of X$ and assigns it to T$.
- Line 520 picks out the second character of X$ and assigns it to U$.

Which method do you prefer? Which method is easier to extend to splitting a three-digit number (100 to 999)? Try both methods in programs to split a three-digit number into its hundreds, tens, and ones digits.

Your Turn

What would you like to see in DragonSmoke? Would you like solutions in both Atari BASIC and Atari Microsoft BASIC? Send requests to George & Bob, P.O. Box 310, Menlo Park, CA 94025.

If you want a reply, enclose a Self-Addressed, Stamped Envelope (SASE).

TECH TIPS

One of the major problems with the new Atari 1200 computer is lack of compatibility with certain existing programs. For instance, neither the Atari Word Processor, LJK's Letter Perfect, nor Datasoft's Text Wizard work on the 1200. An article in *Ad Astra*, the Journal of the Atari Microcomputer Net Amateur Radio Operator User's Group, mentions a possible solution to the problem. Stace, in his article "Test Driving the New Atari 1200XL" suggests copying the 800's OS to disk, then loading it into the 1200XL's RAM in the OS address space.

As you may know, it is possible to define the upper memory of the 1200 as ROM (i.e., the 1200's OS is in effect), or as RAM. If bit 0 of location $D301 (hex) is set to 0, then the OS is disabled and you have access to 64K of RAM. Therefore, it would be necessary to have a loader program present in RAM that could disable ROM and then load the new OS. If any of our more courageous readers are willing to undertake such a project, we will make it worth your while. Whoever first submits a working solution to this problem by U.S. mail will receive a software prize.

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CAN A COMPUTER MAKE YOU CRY?

Right now, no one knows. This is partly because many would consider the very idea frivolous. But it's also because whoever successfully answers this question must first have answered several others.

Why do we cry? Why do we laugh, or love, or smile? What are the touchstones of our emotions?

Until now, the people who asked such questions tended not to be the same people who ran software companies. Instead, they were writers, filmmakers, painters, musicians. They were, in the traditional sense, artists.

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SOFTWARE WORTHY OF THE MINDS THAT USE IT.

We are a new association of electronic artists united by a common goal — to fulfill the enormous potential of the personal computer.

In the short term, this means transcending its present use as a facilitator of unimaginative tasks and a medium for blasting aliens. In the long term, however, we can expect a great deal more.

These are wondrous machines we have created, and in them can be seen a bit of their makers. It is as if we had invested them with the image of our minds. And through them, we are learning more and more about ourselves.

We learn, for instance, that we are more entertained by the involvement of our imaginations than by passive viewing and listening. We learn that we are better taught by experience than by memorization. And we learn that the traditional distinctions — the ones that are made between art and entertainment and education — don't always apply.

TOWARD A LANGUAGE OF DREAMS.

In short, we are finding that the computer can be more than just a processor of data.

It is a communications medium: an interactive tool that can bring people's thoughts and feelings closer together, perhaps closer than ever before. And while fifty years from now, its creation may seem no more important than the advent of motion pictures or television, there is a chance it will mean something more.

Something along the lines of a universal language of ideas and emotions. Something like a smile.

The first publications of Electronic Arts are now available. We suspect you'll be hearing a lot about them. Some of them are games like you've never seen before, that get more out of your computer than other games ever have. Others are harder to categorize — and we like that.

WATCH US.

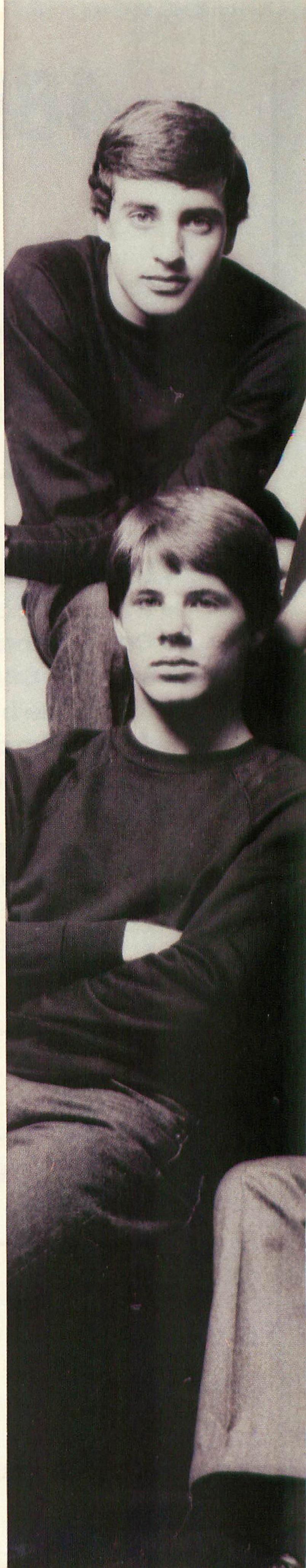
We're providing a special environment for talented, independent software artists. It's a supportive environment, in which big ideas are given room to grow. And some of America's most respected software artists are beginning to take notice.

We think our current work reflects this very special commitment. And though we are few in number today and apart from the mainstream of the mass software marketplace, we are confident that both time and vision are on our side.

Join us.

We see farther.

ELECTRONIC ARTS™





SOFTWARE ARTISTS? "I'm not so sure there *are* any software artists yet," says Bill Budge. "We've got to earn that title." Pictured here are a few people who have come as close to earning it as anyone we know.

That's Mr. Budge himself, creator of PINBALL CONSTRUCTION SET, at the upper right. To his left are Anne Westfall and Jon Freeman who, along with their colleagues at Free Fall Associates, created ARCHON and MURDER ON THE ZINDERNEUF.

Left of them is Dan Bunten of Ozark Softscape, the firm that wrote M.U.L.E. To Dan's left are Mike Abbot (top) and Matt Alexander (bottom), authors of HARD HAT MACK. In the center is John Field, creator of AXIS ASSASSIN and THE LAST GLADIATOR. David Maynard, lower right, is the man responsible for WORMS?

When you see what they've accomplished, we think you'll agree with us that they can call themselves whatever they want.

Conserve RAM



With BASIC's USR function

by JERRY WHITE

While exact figures are unavailable from Atari, it is estimated that more than half of all Atari Home Computer owners have 16K systems. The ATARI 400 is supplied with 16K of memory, but used with the cassette system, there is only 14K of available RAM. Until about a year ago, all ATARI 800 systems were sold with only 16K on board, but owners could add RAM cards to fill out their systems to a maximum of 48K. The ATARI 800 is now sold with the full 48K RAM on board.

Conserving memory is important not only because many programmers must squeeze their work into limited memory space, but also because good programmers are not wasteful programmers. Elegant algorithms and programming techniques which make the most of the computer's capabilities in the least amount of memory space are the signatures of good programmers.

Using the USR command in BASIC can help to conserve memory. The USR function (described on Page 36 of the ATARI BASIC REFERENCE MANUAL), allows a programmer to use machine language assembler routines in the middle of a BASIC program. Such routines require less memory "overhead" than their equivalent in a higher language. The following example will show you how to "hand-assemble" a simple space-saving machine language routine.

Many BASIC programs contain a statement line similar to:

```
100 GRAPHICS 0:POKE 82,2:POKE 83,39:
  SETCOLOR 2,15,0: SETCOLOR 4,15,0:
  SETCOLOR 1,0,13
```

The instructions in Line 100 require 127 bytes of RAM. If you changed the SETCOLOR commands to POKE commands, you could cut RAM usage to 103 bytes:

```
200 GRAPHICS 0: POKE 82,2:POKE 83,39:
  POKE 710,240:POKE 712,240:
  POKE 709,13
```

continued on page 52

Jerry White is a professional programmer whose products are available under several labels, such as Swiftware, Adventure International and Educational Software. He is a Technical Consultant and frequent contributor to ANTIC.



We have over 1000 Educational Programs for use on your Atari 400/800 Computers!

You and your family will enjoy learning in your home when you

Stop Playing with Your Atari

All along you've heard there isn't much of a selection of low cost microcomputer courseware. Well, do you want to learn Physics, Psychology, or Philosophy? Accounting or Auto Mechanics? Sociology, Supervision or Statistics? Economics or Electronics? How about English as a Second Language? Would you like to teach your children Math or Reading? If you do, then we have the educational programs for you—and at affordable prices.

It's true there aren't many companies that offer full-length courses in subjects other than reading and arithmetic, and what is offered seems to be drills, tests, games, or simulations. What you really want is a course that covers the subject with, say, 16 full-length lessons called tutorial programs, where you interact with an expert programmer backed by a staff of experts. That's exactly what we have.

ASK THESE QUESTIONS

Why haven't you heard of us before? We're a public company that's been trading over the counter for 16 years. We've been developing interactive learning systems since 1957. We sell hardware and software for interactive film, slide, video and computer learning to the educational field, vo-techs, industries, military, and several state and federal agencies. Our programs are used in all 50 states and even in some foreign countries! In 1975, we started to convert to the Talk & Teach Computer-Assisted Instruction (CAI) System, licensed Atari to use it in 1977, and in 1981 licensed Radio Shack to use our Talk/Tutor System. So, why haven't you heard of us? Frankly, we've kept a low profile. Until now.

Is there something wrong with our software? Well, we don't ask you to enter your name so we can drop it into some later text. We don't ask you to type in your answer and refuse to accept it if it's not spelled just right. And, we don't branch around a lot when you make an error. Our programs simply let you know if you're wrong by proceeding only when you select the right multiple-choice answer.

This proven learning-by-positive-reinforcement method lets you proceed quickly and smoothly through the programs, without a lot of cute tricks. But, if you're a devoted computerist or game freak you may be disappointed at the lack of motion in most of the pictures, or our special visual effects. We have some dandies, like the mushroom cloud that rises over Hiroshima in our History series, but your learning is not distracted by needless special effects.

OVER 1000 PROGRAMS

We have 64 courses of 16 half-hour programs: 1024 programs! All are easy-reading, upper-and-lower-case. All are in Atari color. All are illustrated by frequent graphics, composed of special and regular characters. And, best of all, every frame of every program is accompanied by high-quality, full-time audio narration by professional voice talent. David Stanton, James Mathers, Pam Barrymore. Recorded and played back, not synthesized or digitized!

– If your child is having trouble with Reading or Math, or if he or she is exceptional, and could benefit from professionally programmed lessons or courses, then you need our educational programs for your Atari 400 or 800 to help your child.
– If you want to build your math skills, we have programs on Numbers and their meanings, Addition, Subtraction, Multiplication, Division, Fractions, Decimals, Percents, Angles, Graphs, Word Problems, Algebra, Statistics. There are ten series in all, 160 math programs. Again, all with color, pictures, and a friendly tutor's voice—all the time.
– If your verbal skills need polishing, try our Talk & Teach programs on the alphabet, spelling skills, and every level of vocabulary; Sight Words or Learn by Phonics; develop Reading Comprehension skills from stories and articles. There's even a series on the Great Classics.
– For self-development, try a 16-program course in Economics or Psychology. Or Supervision, Sociology, Counseling (Personal, School, or Employee), Writing, Business, Philosophy, Government, World History, U.S. History, or Accounting.
– For vocational skills, study our 16-program courses in Electronics, Fluid Power, Auto Mechanics, Shop, Carpentry, Construction, Meat Processing, Military Skills (64 programs), and there are many more.

YOU HAVE WHAT IT TAKES

You'll need your Atari 400 or 800, and the Atari Cassette recorder. And to present the Talk & Teach programs you need the Educational System Master cartridge: it's **$25** from us, if you don't have one.

We say these courses, which are recorded one program per side of C20 to C30 (half hour) cassettes, are the equivalent of a chapter, or perhaps an hours lecture. We've been told that by studying our Economics or Psychology course, a student could pass a secondary or college test for credit. Many who have such credits never learned all that's in these courses. And while some of our courses have 1980 copyrights, most are 1981 and 1982. In U.S. History, for example, you'll learn about America's foreign policy during the Falklands crisis as well as that in the Mideast in 1982. And we're putting this information at your fingertips.

Not sure whether you agree more with Rationalists or Existentialists? Do you commit logical fallacies? Try our Philosophy course. If you're not sure about neurosis or psychosis, classical or instrumental conditioning, then you need our Psychology course. Just how independent is the Federal Reserve? Get Economics, Program 12. Confused about the changes in traditional roles of political parties? It's Government 5. And let our tutor tell you patiently and clearly about measures of dispersion and central tendency. Our Statistics goes through F tests. We even have 16 full-length audio-computer programs with Spanish words and phrases.

Remember, these are all for your Atari! Yes, we've done programs for TRS80 Model I, III, Color, for the Apple and T. I. But that's another story.

Would you like to do something more than play games on your Atari? Tired of squeaks and robotics and want to hear a human voice? Do you want to further your education or help your children along in theirs? Now you can. For just **$9.90**, we'll send you one cassette with 2 programs from the course of your choice, 100% guaranteed to work in your Atari, and you can try us out. Better yet, get one full course of 16 programs on 8 cassettes for only **$59.90**. For full documentation, 32 pre-post tests, fancy binder, 8 cassettes with 16 programs of the course you want, send **$79.00**. That's less than books and tuition for most college classes. And we offer a 10 day, 100% exchange allowance. Does your alma mater? Send us your check, or call us at (405) 288-2301 with your Visa/Master Card number. We'll send your educational software pre-paid. Please allow 15 days delivery. Or see your Atari dealer. He may have some of our courses in stock. You've got nothing to lose but your games!

DORSETT
Educational Systems, Inc.

P.O. Box 1226, Norman, OK 73070
(405) 288-2301

VISA MasterCard

CONSERVE RAM *continued from page 50*

The value that is POKEd into the color registers is found by multiplying the desired hue by 16 then adding the luminance (a table of hues is found in the ATARI BASIC REFERENCE MANUAL on Page 50).

In assembler, the equivalent command to the POKE command is a two-step sequence of "load accumulator" (LDA) and "store accumulator" (STA). The sample DATA2STR program below creates a machine language subroutine that executes these POKE commands. The Assembly Language code is indicated in the REM statements.

PROGRAM OPERATION

The new Line 100 will be added to this program when it RUNs. Line 100 will begin with the GRAPHICS 0 command, but the POKE commands for margin settings and screen colors will be replaced with a USR command and a string of machine language instructions. This new line will require but 77 bytes of RAM.

After typing DATA2STR into your computer, be sure to SAVE it. This is always important when you are working on BASIC programs which contain machine language subroutines. The computer can lock up if you have accidentally made a typo or missed a keystroke, and you may have to turn the computer off and restart. If you haven't SAVEd your program to disk or cassette, you will have to retype the whole thing!

When you successfully execute DATA2STR it will generate a new Line 100. For demonstration purposes, you will note that Line 100 ends with a STOP command. If you run this program a second time, your screen colors should be different, and the program will stop at Line 100. You may then type CONT (or CON.) and press RETURN to continue. The screen will briefly show its original colors, and Line 100 will be created once again.

AVOID NUMERIC CONSTANTS

Whether you use the USR function or not, one of the greatest consumers of memory in ATARI BASIC programs is the numeric constant. Every time you use a number that is not part of a character string, it costs 7 (yes, seven!) bytes of RAM. Thus many programmers use numeric variables for commonly-used numbers such as 0 and 1. Once you have defined these variables, each additional reference to that number variable will cost only one byte, no matter how long the variable name is. So a number such as "1" may be redefined N1 = 1 or N2 = 2. If you like descriptive variables, then you might use ZERO = 0, ONE = 1, TWO = 2, etc. Note, however, that while you can say ZERO = *0 or TWO* = 2, you must say LET ONE = 1. Without the command LET, the BASIC language will interpret your command as ONE.

If you are serious about personal finance...

- **Budget Forecast** – 26 expense categories
- **Check Entry** – easy data entry – scan & modify 26 major & 36 sub-categories – information block
- **Check Search** – single or multiple parameters – (up to seven) to search entries
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- **Checkwriter** – prints your custom checks
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- **Handsome Tinted Plastic Storage Case**



COMPUTE!
The Leading Magazine Of Home, Educational, And Recreational Computing

In a feature editorial.

"If you want to use a finance system, but don't want to spend several days trying to learn how to use one, then A Financial Wizard by Computari may be just what you need."

"The illustrated manual that comes with this program is clear, direct, and very thorough."

"It appears that this finance system was designed to achieve the best and most comfortable working relationship between the user and the program."

"The check entry routine is the most attractive feature of this finance system. Data prompts are very clear and the category item names are displayed at all times during data entry for your convenience."

"The file search capabilities of this program are superior. You are offered seven ways to look up the checks."

"The system is disk intensive. All data is saved automatically and immediately following all routines that either enter data or modify it."

"Scanning your entries is made possible by pressing START. You can see records very quickly this way."

"This is an excellent finance system – entertaining, accurate, and fun to use."

ANALOG COMPUTING
THE MAGAZINE FOR ATARI COMPUTER OWNERS

Analog Magazine in a comprehensive study of personal finance systems for Atari* computers.

"A Financial Wizard from Computari is by far the best of these programs and will be the standard of comparison for the others."

"The check entry mode is easy to use..."

"The way a Financial Wizard handles your tabulations is excellent. You can chart your actual expenses vs. your budget by month, by category or year to date."

"...where it really outshines the rest is in the check reconciliation."

"In effect it gives you your bank statement on the screen, a complete list by month of all your checks and deposits."

"A Financial Wizard has one disk that does everything..."

"Graphics, while really not a factor in the quality of programs of this type, do make your budgeting chores a little more pleasant. Again A Financial Wizard comes out on top."

"Everything about this program is excellent..."

Antic
The ATARI Resource

In a Report from Antic.

"Like most Atarians, I am captivated by the graphic, color and sound capabilities of my machine. Nothing quite discourages me more than to boot up an applications program (personal, business, etc.) and to be presented with the standard graphic 'o' white characters on a blue screen.

Of course the usefulness and effectiveness of a program is of primary importance. However, enhancing the dullest of applications programs with some of Atari's charms, is a great asset. A Financial Wizard, a personal finance program by Computari's Bill McLachlan, is an excellent example of an applications program that integrates many of the Atari's features into a well conceived and executed program."

"The use of color and sound in the data input prompts and error checking routines are so well done that it's quite simple to boot up the disk, follow along with the very clear documentation, and be 'up and running' in short order."

"I give A Financial Wizard high marks in ease of use, documentation and performance. If a disk-based home finance package is in your future, The Wizard should get serious consideration."

Computari's
A Financial Wizard 1.5
The logical choice.

The system is designed for Atari computers having a minimum of 32K and operating from a disk drive. The cost is only $59.95 plus $3 for handling/postage.

If your dealer does not have **A Financial Wizard** . . . Telephone orders are accepted on Mastercharge or Visa credit cards. Mail order must be accompanied by check or money-order or credit card #.

Dealer inquiries invited.

*trademark of Atari Inc.

OK residents ad 4% Tax.

Exclusively thru **ON LINE** COMPUTER CENTERS of OKC™ (405)751-7925
10944 North May, Oklahoma City, OK 73120

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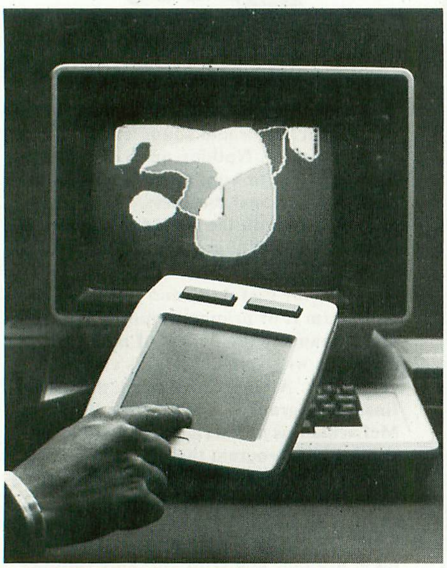
Signature ____________________

NEW PRODUCTS

KOALAPAD

(touch tablet)
Koala Technologies Corporation
4962 El Camino Real, Suite 125
Los Altos, CA 94022
(415) 964-2992
$125.00 (including software)

Koalapad is a small, lightweight, touch tablet that can reproduce drawn or written images, serve as a custom keyboard, move cursors or objects around a video display, and act as a game controller. Comes with software for basic painting, drawing and graphics.



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(disk editor)
Allen Macroware
(please note new address)
Post Office Box 2205
1906 Carnegie #E
Redondo Beach, CA 90278
(213) 376-4105
16K — Diskette
One or two disk drives

Provides disk editing repair and duplication for ATARI and PERCOM drives. Repairs DOS/non-DOS sectors with on-screen Hex/ASCII editing. Will print all modes to any printer and will print inverse and special graphics characters to Epson and Graftrax and NEC 8023A printers. Has onboard disassembler and a complete manual. Now 1200XL compatible.



HEADMASTER

(media head and video screen cleaners)
SSK Enterprises, Inc.
2488 Townsgate Road
Westlake Village, CA 91361
(213) 889-1831

Dissolve and remove contaminants from your disk drive and cassette player heads with the non-abrasive cleaner in this complete line of cleaners and accessories for microcomputers. The Aerosal Anti-Static Treatment reduces damages caused by static electricity for up to two months with one treatment. The Screen Cleaner cleans and protects your VDT from static dust build-up and prevents yellowing of the plastic coating.

SUPERSHOPPER

(food management program)
Major Domo Software
Drawer DD
Bethel Island, CA 94511
$35.95 (two disks)

Restaurant owners and homemakers can use this powerful food and grocery management aid to prepare budgets and shopping lists for up to one thousand items. Common grocery store items from aspirin to zucchini are stored on a Master List diskette, with description, price, date and a code for your food supplier. You can also keep track of changing costs at up to forty different grocers, and a printed shopping list will direct you to the market of your choice for particular items.

BUSI-KEY

(keypad)
CT Systems
10885 Katy Fwy., Suite 22
Houston, TX 77079
(713) 464-9224
$114.95 — postage paid in U.S.

Though this direct, plug-in unit keypad requires no software support, commercial software can be used with it. The pad provides numbers zero through nine, a decimal point, and all cursor controls, and math operators. Additional keys include RETURN, CTRL, back space, and comma. Requires computer disassembly, but no soldering.

ICS 800

(inventory program)
Sierra Digital Research, Inc.
P.O. Box 50089
100 Washington Street, Suite 104
Reno, NV 89513
(702) 323-3856
32K — Cassette
40K — Diskette
$135.00

A complete inventory program for the 800, it features price fields up to $100,000, and keeps track of 500 inventory items per disk. You can generate five different kinds of reports including summary statistics, file contents, re-order reports, vendor lists and price lists. A sample data base is available for training purposes.

ULTRA DISASSEMBLER

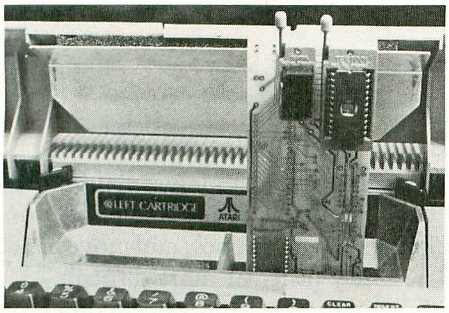
(utility)
Adventure International
P.O. Box 3435
Longwood, FL 32750
(800) 372-7172
(305) 862-6917
$49.95

The second program in its Ultra Utility series, AI has just released this sophisticated labelling disassembler which closely re-creates the source code from which a machine language program was assembled. It reads code in from memory, but it also disassembles DOS files and even code from a list of specified disk sectors. Source code may be edited and reassembled with other popular Atari assemblers.

ACI-3 CASSETTE INTERFACE

(hardware)
Micro Systems and Software, Inc.
P.O. Box 307
Denver, Colorado 80221
$44.95

The ACI-3 interfaces any monaural or stereo cassette tape recorder / player to the 400 / 800 computers. It plugs into the serial port and into your own recorder to provide an alternative to the ATARI 410. Reliable phase locked loop construction should also allow storage up to 1200 baud with appropriate software (available soon).



CARTRIDGE MAKER

(EPROM burner)
Radical Systems
2002 Colice Road, S.E.
Huntsville, AL 35801
$89.00 plus $3 shipping

Make your own cartridges with this EPROM (erasable program read-only memory) cartridge burner. It allows you to burn single voltage 2K or 4K EPROMS or backup cartridge ROM's. It plugs into the right cartridge slot with no extra cable required. You can use it along with the Assembler / Editor cartridge or DOS.

ATARI CARRYING CASE

(case for the 800)
Wolsten's Computer Devices, Inc.
99 Washington St.
East Orange, NJ 07017
(201) 678-0008
$49.95

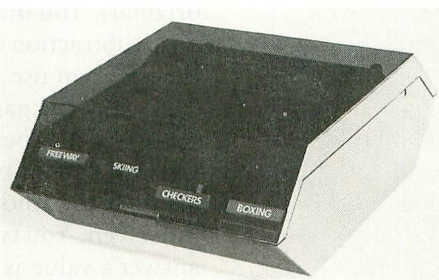
This lightweight but durable plastic case can withstand the weight of a full grown adult, and features snap locks and an eternal living hinge. It also snugly holds manuals and power supply — ready to hook up to a TV set anywhere.



MICRO WORK STATIONS

(computer table)
P.O. Box 100 Interstate Park
Williamsport, MD 21795
(301) 223-8900
$185.00

Fifty-inch, bi-level work station to house computer, monitor, disk drives and printer. The 26½ inch level makes for effortless typing while the 36-inch monitor level provides comfortable viewing. Units come disassembled but even a child can put them together in minutes. Many other units also available.



VIDEO GAME SPACE CASE

(storage case)
Nielsen Plastics, Inc.
1380 Third Avenue
New York, NY 10021
(212) 772-2760
$24.95

This sleek and compact plastic case is designed to store and protect your VCS game console, joystick and video games. It holds up to 28 game cartridges, and has a hidden carrying handle and a snap-lock translucent dust cover.

KNIGHTS OF THE DESERT

(simulation game)
Strategic Simulations, Inc.
883 Stierlin Road, Bldg. A-200
Mountain View, CA 94043
(415) 964-1353
48K — Diskette
$39.95

This game re-creates the North African campaign of WWII in which the British troops held off the sweep of Rommel's Panzer divisions as they moved toward Alexandria. Each player's objective is to push the opponent as far back along the coast as possible while capturing towns along the way. In solitaire mode, the computer ably directs the British forces.

CLIPPER: AROUND THE HORN IN 1850

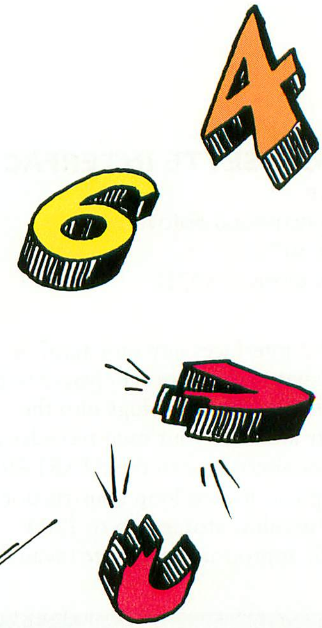
(simulation game)
Program Design, Inc.
95 East Putnam Avenue
Greenwich, CT 06830
(203) 661-8799
24K — Cassette
32K — Diskette
$29.95

This game simulates a 19th century sea journey from New York to San Francisco via Cape Horn, the southern-most tip of South America. Fierce storms, deadly calms and mutinies threaten the completion of your voyage. Realistic nautical graphics are featured, as well as well-known sea chanties and tales from an "old salt" on the optional voice track.

THE MASTER MEMORY MAP TUTORIAL

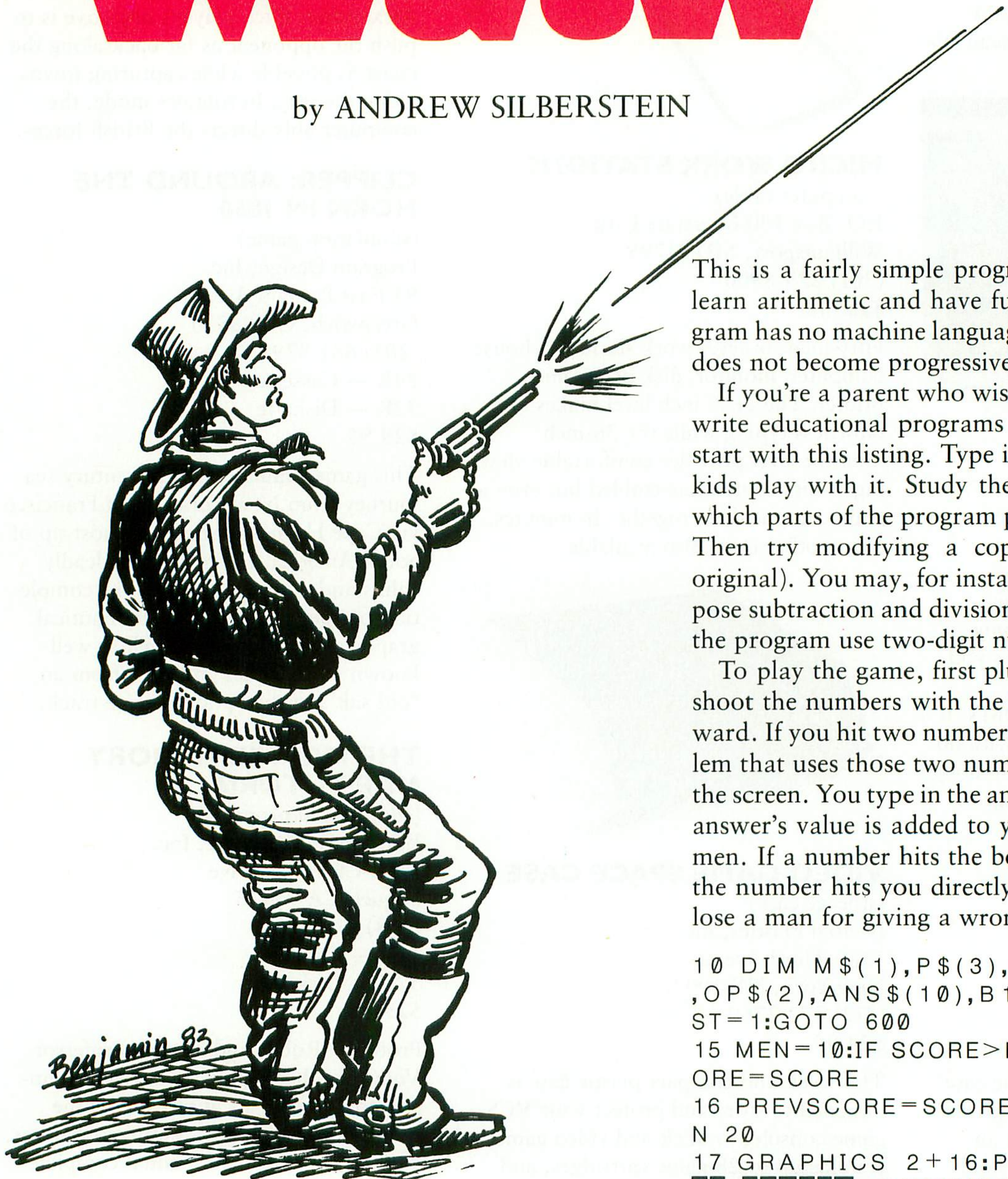
(educational program)
Educational Software, Inc.
4565 Cherryvale Ave.
Soquel, CA 95973
(408) 476-4901
16K — Cassette
32K — Diskette
$29.95

Proto the Robot and his pal, Professor VonChip, thoroughly cover over 30 important memory locations within the ATARI. Special effects, sample programs, and a fully-illustrated manual complete this tutorial.



Shoot 'em Up Math

by ANDREW SILBERSTEIN



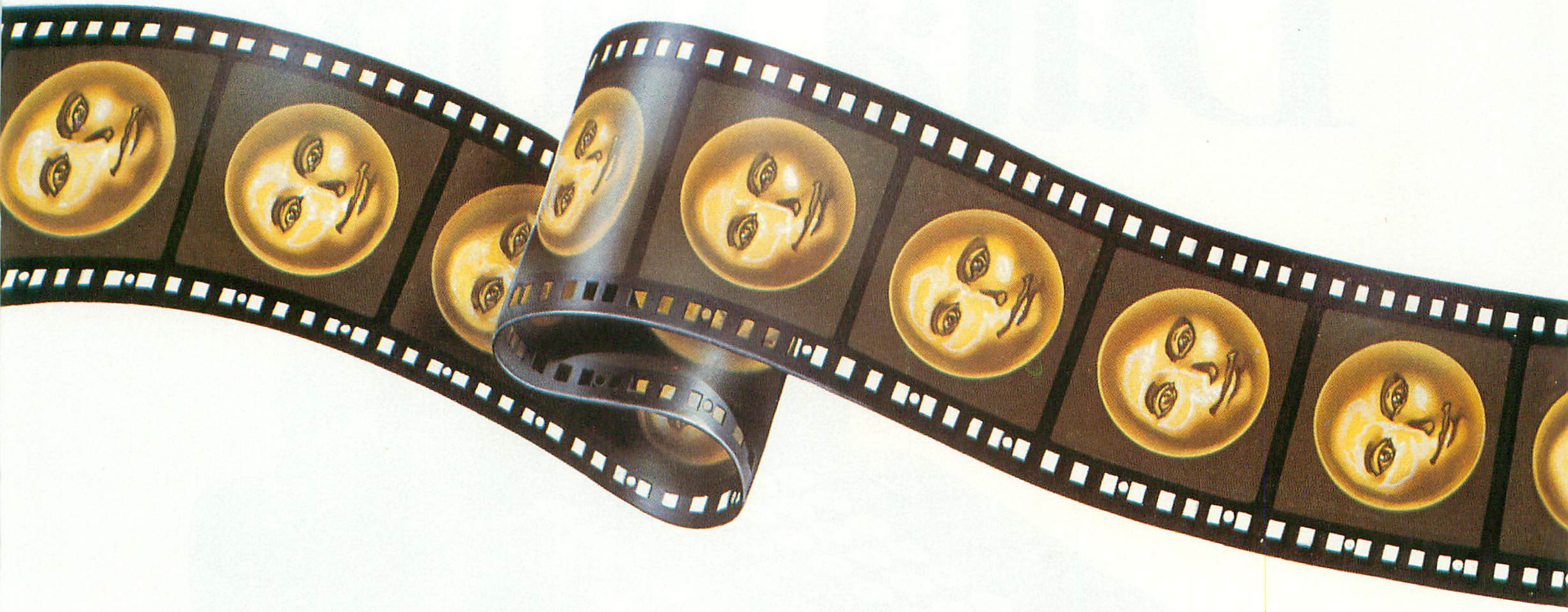
This is a fairly simple program which allows children to learn arithmetic and have fun at the same time. The program has no machine language subroutines, and movement does not become progressively faster or more difficult.

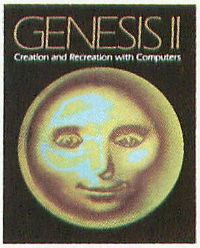
If you're a parent who wishes to learn BASIC in order to write educational programs for your children, you might start with this listing. Type it in, play with it, and let your kids play with it. Study the listing and try to determine which parts of the program perform the various functions. Then try modifying a copy of the program (not the original). You may, for instance, wish to have the program pose subtraction and division problems; or, you could have the program use two-digit numbers.

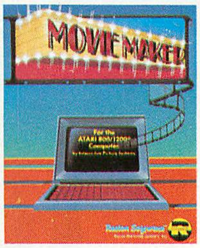
To play the game, first plug in your joystick. You must shoot the numbers with the fire button as they fall downward. If you hit two numbers in a row, an arithmetic problem that uses those two numbers appears at the bottom of the screen. You type in the answer, and if you're correct, the answer's value is added to your score. You start with ten men. If a number hits the bottom, you lose a man, and if the number hits you directly, you lose five men. You also lose a man for giving a wrong answer.

```
10 DIM M$(1),P$(3),QQ(2),BL$(1),B$(20)
,OP$(2),ANS$(10),B1$(20),B2$(20):SC=0:
ST=1:GOTO 600
15 MEN=10:IF SCORE>MAXSCORE THEN MAXSC
ORE=SCORE
16 PREVSCORE=SCORE:SCORE=0:IF ST=1 THE
N 20
17 GRAPHICS 2+16:POSITION 2,2:? #6;"YO
UR SCORE: ";PREVSCORE
```

continued on page 59







CONTEST!

For the best computer animation sequence created using MovieMaker™. . $1000 prize. Entries should be submitted on disk by December 31, 1983. Winning entry will be shown at 1984 West Coast Computer Faire. For more details, contact Reston Publishing Company.

RESTON CLOSES THE GAP BETWEEN ART AND COMPUTERS

In Reston's new book, **Genesis II, Creation and Recreation with Computers,** by Dale Peterson, artists, writers and musicians use computers to create new visions, new sounds and new ways of expressing themselves, all interwoven with stunning illustrations. With **Movie Maker**, an exciting new program for the Atari ® Home Computer by Interactive Picture Systems, you'll learn how to do these things yourself. You'll compose scenery and shapes, then propel them into continuous, flicker-free action. You'll actually make a short animated movie, right at your keyboard. Let Reston release the creative spirit in you.

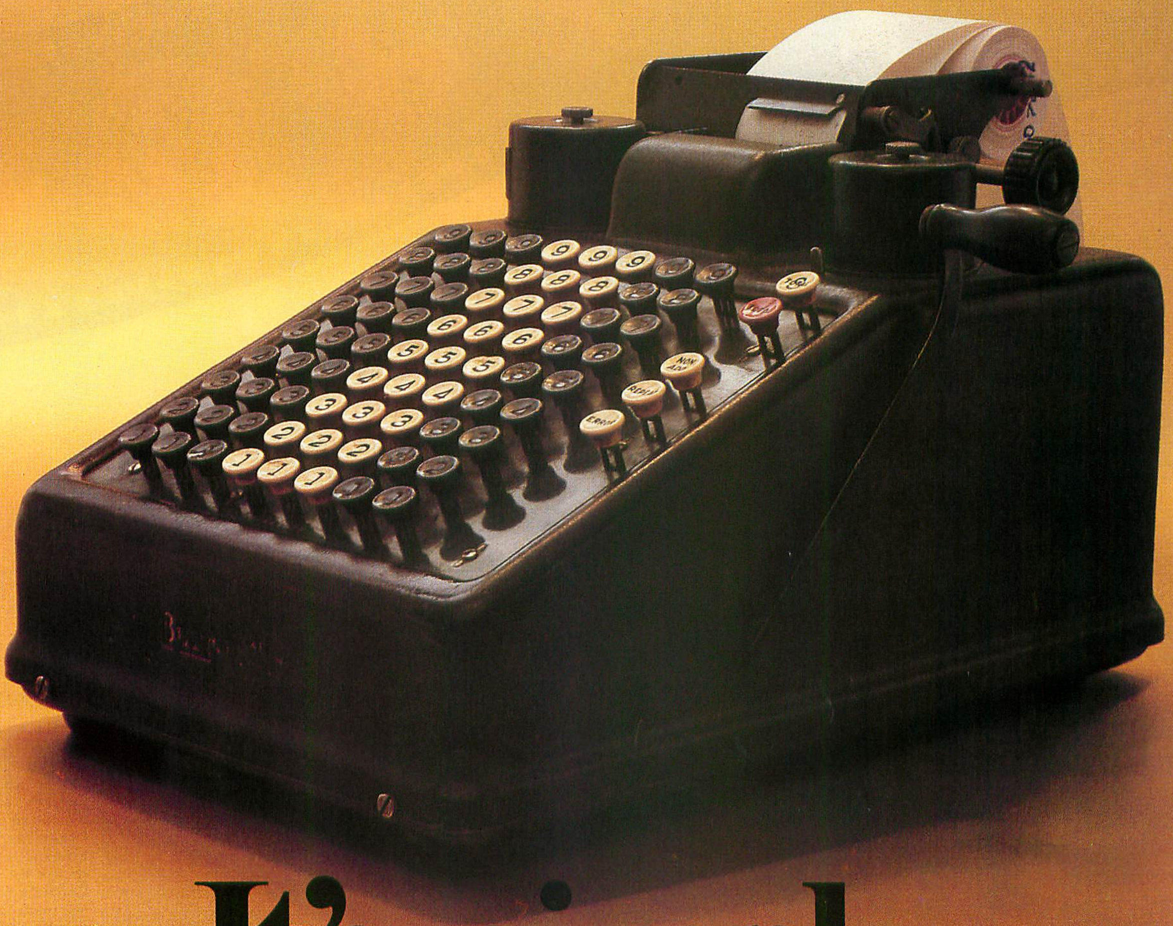
MovieMaker is a Creative Pastime™ from Reston Software™

A Prentice-Hall Company
11480 Sunset Hills Rd.
Reston, VA 22090
Available at your local bookstore and computer retailer or call us at
(800) 336-0338.

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For the Atari 800 with 48k memory. Coming soon: 16k ROM cartridge.

Data work.



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Now **Data Perfect**™ from LJK helps you organize your files and numbers like the adding machine first helped your grandfather. It keeps tax records. Lets you change files easily. List and edit addresses. Compares stocks. Stores expenses. It even calculates. Used with Letter Perfect™, you can even make custom mailings. Simply.

When it comes to practical software for Ataris, Apples and look alikes, Data Perfect is simple to learn. And hard to beat. Ask your dealer for a demonstration, or write LJK for more information.

LJK™

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SHOOT 'EM UP MATH *continued from page 56*

```
18 POSITION 2,4:? #6;"high score:  ";M
AXSCORE:POSITION 2,8:? #6;"PUSH start"
19 SETCOLOR 3,INT(RND(0)*16),8:IF PEEK
(53279)<>6 THEN 19
20 GRAPHICS 1+16:POKE 559,0:POKE 756,C
H:IF MEN<0 THEN MEN=0
30 B$=""$$$$$$$$$$$$$$$$$#":B1$="!
                  !":B2$="%'''''''''''''
''''&":M$=".":P$=" ( ":BL$=" "
31 REM NOTE-- B1$ in line 30 contains
18 spaces between two !'s.
33 POSITION 8,0:? #6;"MEN:";:POSITION
13,0:? #6;MEN;:POSITION 2,2:? #6;"SCOR
E:":POSITION 10,2:? #6;SCORE
35 JS=60:J=110:HIT=1180:MOVE=62:DPY=1:
Q=0
40 ? #6:? #6;B$;:FOR I=1 TO 17:? #6;B1
$;:NEXT I:? #6;B2$
41 X=8:Y=20:POSITION X,Y:? #6;P$
42 POKE 559,34:IF MEN=0 THEN 500
43 PX=INT(RND(0)*16)+2:PY=5:NUM=INT(RN
D(0)*10):POSITION PX,PY:? #6;NUM
45 GOTO J
60 S=STICK(0):DX=(S=5 OR S=6 OR S=7)-(
S=9 OR S=10 OR S=11):RETURN
62 DPX=INT(RND(0)*3)-1:POSITION PX,PY:
? #6;BL$
63 PX=PX+DPX:IF PX<2 THEN PX=3
64 IF PX>18 THEN PX=17
65 PY=PY+DPY:IF PY>20 THEN GOSUB 2500:
GOTO 42
66 IF PX=X+1 AND PY=Y THEN FOR I=1 TO
20:SOUND 1,200+I,6,12:NEXT I:SOUND 1,0
,0,0:POP :MEN=MEN-5:GOTO 20
67 POSITION PX,PY:? #6;NUM:RETURN
80 ANS$=STR$(T):POSITION 6,23:FOR I=1
TO LEN(ANS$):? #6;CHR$(ASC(ANS$(I,I))+
128);:NEXT I:? #6;"      "
81 ANS$="":FOR WW=1 TO 1000:NEXT WW:RE
TURN
110 GOSUB JS:X=X+DX:FOR WW=1 TO 10:NEX
T WW:IF X<1 THEN X=1
120 IF X>16 THEN X=16
130 POSITION X,Y:? #6;P$:IF STRIG(0)=0
 THEN 150
135 GOSUB MOVE
140 GOTO J
150 XX=X+1:YY=Y-1:POSITION XX,YY:? #6;
M$
155 IF STRIG(0)=0 THEN GOSUB MOVE
160 LOCATE XX,YY-1,Z
170 IF Z<>32 THEN 200
180 YY=YY-1:POSITION XX,YY+1:? #6;BL$:
POSITION XX,YY:? #6;M$:GOTO 160
200 IF Z=ASC("$") THEN POSITION XX,YY:
? #6;BL$:GOTO J
202 IF Z>57 OR Z<48 THEN POSITION XX,Y
Y:? #6;BL$:GOTO 180
205 IF Z>=48 AND Z<=57 THEN GOSUB 3000
210 Q=Q+1:QQ(Q)=Z-48:IF Q=1 THEN POSIT
ION 2,23:? #6;CHR$(Z+128)
215 IF Q<2 THEN GOTO 43
220 Q=0:T=QQ(2)+QQ(1)*(LEV=1)+(QQ(1)-1
)*QQ(2)*(LEV=2)
230 POSITION 3,23:? #6;OP$(LEV,LEV);CH
R$(Z+128);"=?";
240 OPEN #1,4,0,"K:"
250 K=K+1:GET #1,A
260 IF A=126 THEN POSITION 6,23:? #6;"
   ":K=0:ANS$="":GOTO 250
270 IF (A<48 OR A>57) AND A<>155 THEN
K=0:ANS$="":POSITION 6,23:? #6;"
 ";
271 IF (A<48 OR A>57) AND A<>155 THEN
SOUND 3,150,12,10:FOR WW=1 TO 100:NEXT
 WW:SOUND 3,0,0,0:GOTO 250
275 IF A=155 AND LEN(ANS$)<1 THEN K=0:
ANS$="":POSITION 6,23:? #6;"      ";
276 IF A=155 AND LEN(ANS$)<1 THEN SOUN
D 3,150,12,10:FOR WW=1 TO 100:NEXT WW:
SOUND 3,0,0,0:GOTO 250
280 IF A<>155 THEN POSITION 6+K,23:? #
6;CHR$(A);
285 IF A=155 THEN 300
290 ANS$(K,K)=CHR$(A):GOTO 250
300 ANS=VAL(ANS$)
310 IF ANS=T THEN GOSUB 2000
315 IF INT(SCORE/(50*LEV))-SC=0 THEN 3
20
316 SC=INT(SCORE/(50*LEV)):MEN=MEN+1:F
OR I=1 TO 30:SOUND 0,200-I,10,8:NEXT I
:SOUND 0,0,0,0:GOSUB 550
320 IF ANS<>T THEN MEN=MEN-1:SOUND 3,2
00,12,8:FOR WW=1 TO 200:NEXT WW:SOUND
3,0,0,0:GOSUB 550:GOSUB 80
330 IF MEN=0 THEN ANS$="":T=0:CLOSE #1
:K=0:POSITION 2,23:? #6;"
      ";:GOTO 500:REM 18 spaces
400 ANS$="":T=0:CLOSE #1:K=0:POSITION
2,23:? #6;"                  ";:GOTO 4
3:REM 18 spaces
500 POSITION 10,23:? #6;"       ":POSI
TION 5,10:? #6;"game over":FOR WW=1 TO
 800:NEXT WW:SC=0:ST=0:GOTO 15
501 REM 7 spaces in line 500
550 IF MEN<0 THEN MEN=0
555 POSITION 13,0:? #6;MEN;" ":RETURN
600 LEV=1:OP$="+X":GRAPHICS 2:? #6;"##
##################  LEVEL  ###
##################";
610 ? #6;"#########################
###########";
620 ? #6;"### SHOOT 'em up ######
     ######     MATH     ########
##############";
630 ? #6;"###################";:POSIT
ION 13,1:? #6;LEV;
635 POKE 752,1
640 ? "Push START to play":? "Push SEL
ECT to change the level":? "Push OPTIO
```

continued on next page

```
N for instructions";
645 IF PEEK(53279)=7 THEN 645
650 KEY=PEEK(53279)
660 IF KEY=6 THEN 1300
670 IF KEY=3 THEN 700
680 IF KEY=5 THEN LEV=LEV+1:IF LEV=3 T
HEN LEV=1
685 POSITION 13,1:? #6;LEV
690 IF PEEK(53279)<>7 THEN 690
695 GOTO 645
700 GRAPHICS 0:POKE 752,1:? "        I
NSTRUCTIONS "
710 ? :? "   Level 1 is addition.":?
"   Level 2 is multiplication."
715 ? :? "   Use a joystick."
720 ? :? "   You start with 10 men.
Try to":? "hit 2 numbers for your math
 problem."
725 ? "If a number reaches bottom befo
re you":? "hit it you lose a man. If t
he number":? "hits your ";
730 ? "man you lose 5 men.  If you hit
 2 numbers without being hit, you":? "
will get ";
735 ? "a math problem with those":? "n
umbers. If you get the right answer,":
? "the sum of the 2 numbers is added"
740 ? "to your score. If you are wrong
, you lose a man. A bonus man will be
 added each 50 points for level 1";
745 ? " or each":? "100 points for lev
el 2."
800 POSITION 2,22:? "Push START"
810 IF PEEK(53279)<>6 THEN 810
820 GOTO 600
1180 FOR N=0 TO 15
1190 SETCOLOR 4,4,15-N
1195 SETCOLOR 3,INT(RND(0)*16),4
1200 SOUND 0,20,0,15-N
1210 SOUND 1,227,6,15-N
1220 FOR WW=1 TO 30:NEXT WW
1230 NEXT N
1240 SETCOLOR 4,0,0:RETURN
1300 CH=PEEK(106):CH=CH-8
1305 POKE 559,0
1310 CHSET=CH*256:FOR I=0 TO 512:POKE
CHSET+I,PEEK(224*256+I):NEXT I
1320 FOR I=0 TO 63:READ N:POKE CHSET+8
+I,N:NEXT I
1325 GOTO 15
1330 DATA 60,120,240,120,60,30,15,30
1331 DATA 15,31,63,127,240,240,120,60
1332 DATA 240,248,252,254,15,15,30,60
1333 DATA 129,195,231,255,126,60,24,0
1334 DATA 60,120,240,240,127,63,31,15
1335 DATA 60,30,15,15,254,252,248,240
1336 DATA 0,24,60,126,255,231,195,129
1337 DATA 195,102,60,126,255,255,126,6
0
2000 FOR I=1 TO QQ(1)+QQ(2):SCORE=SCOR
E+1
2010 POSITION 10,2:? #6;SCORE:SOUND 0,
30,10,10:FOR WW=1 TO 50:NEXT WW:SOUND
0,0,0,0:NEXT I:RETURN
2500 MEN=MEN-1:POSITION XX,YY:? #6;BL$
:FOR I=1 TO 50:SOUND 2,I,4,6:NEXT I:SO
UND 2,0,0,0:GOSUB 550:RETURN
3000 POSITION XX,YY:? #6;BL$:POSITION
XX,YY-1:? #6;CHR$(138):GOSUB HIT:POSIT
ION XX,YY-1:? #6;" ":RETURN
```

TYPO TABLE

Variable checksum = 1236656

Line num range			Code	Length
10	–	20	FG	513
30	–	41	VU	514
42	–	66	JU	534
67	–	170	LQ	440
180	–	240	KZ	502
250	–	276	HO	565
280	–	330	JD	580
400	–	610	ST	520
620	–	690	GW	500
695	–	735	IY	561
740	–	1230	JB	445
1240	–	1335	ZI	410
1336	–	3000	KY	481

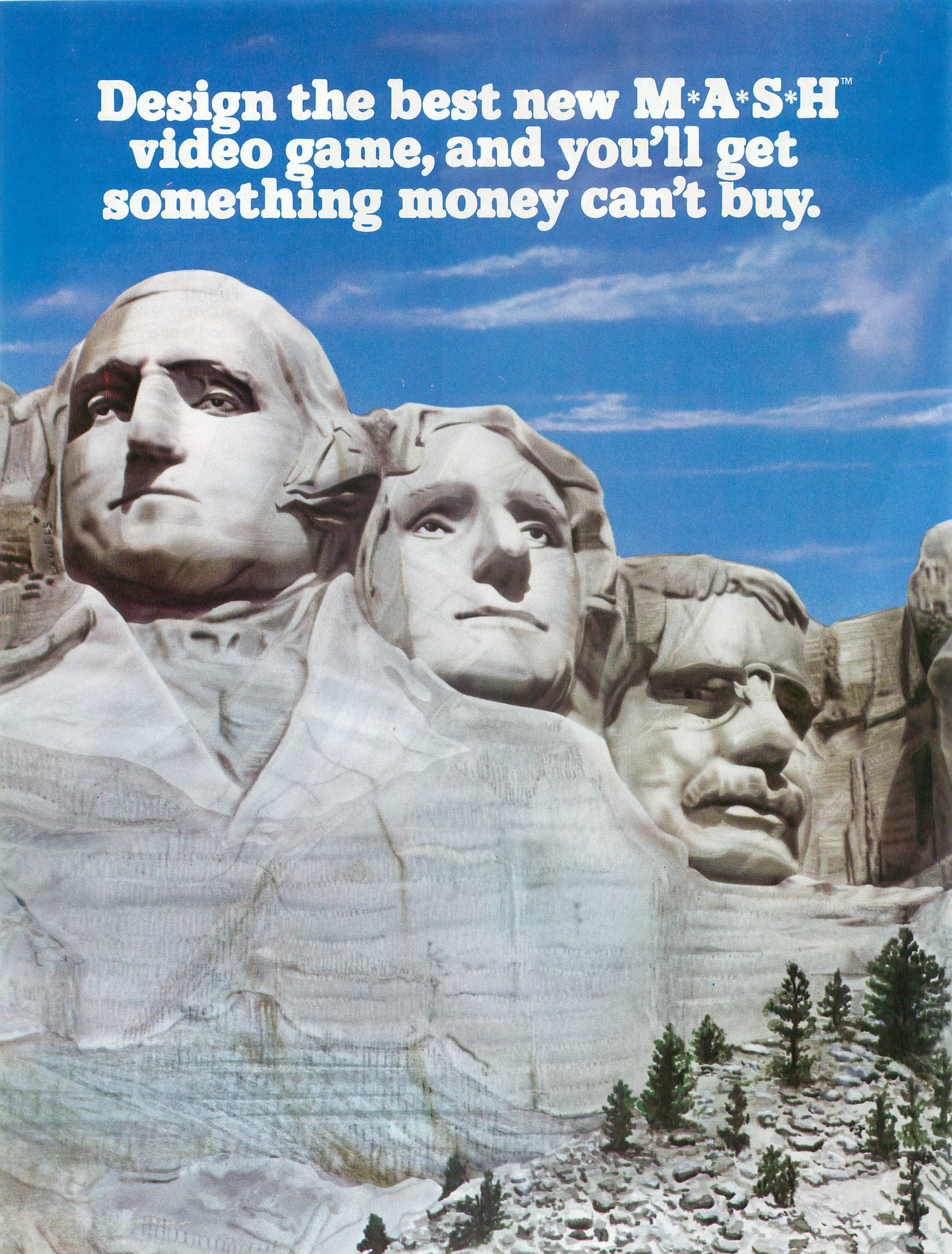
HAVE YOU FLOWN YOUR ATARI TODAY?



Imagine yourself at the controls of a small, single-engine plane, 10,000 feet in the air, on your approach to the runway and safety. You're running low on fuel, but your instruments show that you're on the glide path, and lined up with the runway. It's a beautiful, sunny day, and you can see the airport in the distance, across the grassy fields. But the crosswind is tricky, and it will take all your skill to land safely. You're coming down now, and the runway is getting closer. A bit left, OK, now lower the power, fine, now put down the flaps. Pull the nose up a bit more, you're a little low. Watch the power! Don't stall. OK. Here comes the runway. You hear the squeal of tires on pavement, your pulse quickens, you're down, but watch it, you're pulling right! Brakes, brakes! Left more! You've stopped safely! Good job. The first real-time flight simulator for ATARI is now available from MMG Micro Software. Written entirely in machine language, there are four levels of difficulty, landings in clear or foggy weather, landings with or without instruments, and with or without the real-time view from the cockpit. **Final Flight!** requires Atari 400/800, 24K, 1 joy stick, and is offered on tape or disk for the same suggested retail price of $29.95.

MMG

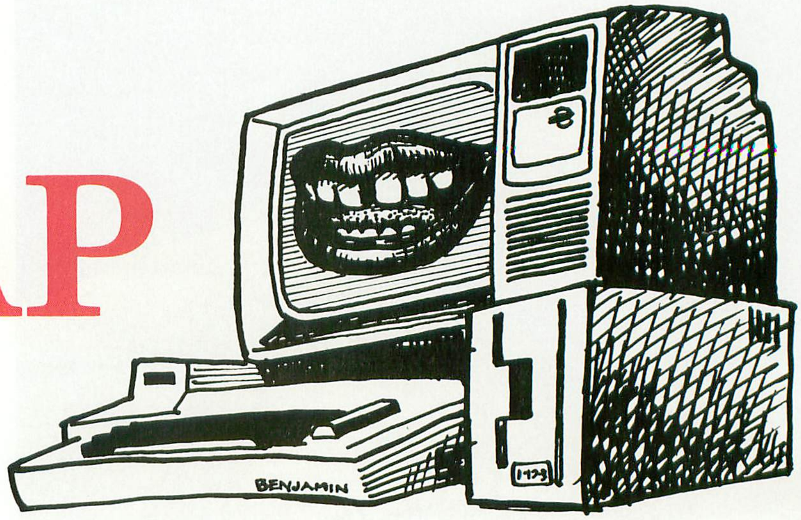
Final Flight! is available at your local dealer or direct from **MMG Micro Software.** Just send check or money order to P.O. Box 131, Marlboro, N.J. 07746 or for Mastercard, Visa, and C.O.D. deliveries call **(201)431-3472.** Please add $3.00 for postage and handling. New Jersey residents add 6% sales tax.


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TALK IS CHEAP

by ED STEWART



For about fifteen dollars you can make your ATARI computer speak. In fact you can make it whistle, hum, sing or curse. You can save the speech on a disk for posterity and play it back anytime you like.

Sound too good to be true? Well, there are some limitations to this technique, but for the most part it works very well. I've been playing around with it for some time and decided to share it with other ATARI fans.

I am no hardware expert, but I had been looking for an Analog / Digital device for the ATARI and discovered that the ATARI has a built-in A / D converter. In fact it has eight of them — the ports for the paddle controllers. This led me to an article in BYTE (April, '80) titled "Apple Audio Processing" by Mark Cross. This article described a circuit to input audio data to the four game-paddle inputs on the Apple. These are similar to the ATARI paddle ports. Both are A / D converters which generate a *count* in response to circuit resistance.

The ATARI paddle ports are actually potentiometers (variable resistors) whose resistance changes as the paddle is rotated. If this resistance is changed fast enough, and if it has a direct relationship to the sound waves produced by speech, then we can read the "paddle" values and store the numbers related to the input speech patterns.

A simple circuit converts the voltage produced by a microphone into a variable resistance which is read by the computer. This number is then saved and sent to the TV speaker to produce a voltage which is in direct proportion to the paddle resistance. The result is recognizable reproduction of whatever sounds are uttered through the microphone.

ATARI Hardware

A 9-pin female connector is needed to plug into the joystick / paddle port. APX-9001 is a good plug and it sells for $6.25. The software presented here requires this plug to go into the third port from the left. A description of the controller port pins can be found in section III of the ATARI Hardware Manual. For a brief description of the console end (male) see Figure 1.

A double-stranded, insulated wire about two to three feet long should be soldered to your female plug with one wire to pin 9 and the other to pin 7 (+ 5V). The other end of the double wire will enter into the circuit pictured in Figure 2.

The POKEY chip converts the POT resistances into numbers. This technique is called voltage-to-frequency conversion, and is noted for low cost and relative inaccuracy, reflected in the speaker output as noise and hiss. Still, most of the original sound remains intact. POKEY normally requires 228 TV scan lines to read the POT. The number produced by POKE is actually a *count* of scan lines it took to charge a capacitor located in POKEY.

If there is little resistance (paddle knob turned right), the capacitor charges in fewer scan lines and the resultant number is smaller. A *fast* POT-scan mode is available, which causes the capacitors to charge up in only two scan lines. This fast POT-scan is what we use to read the values from the microphone, because the values must be read thousands of times per second and the normal POT-scan mode is much too slow.

Other Hardware

The following items are needed to construct the circuit in Figure 2:

1 moving coil type microphone found in cassette recorders
1 0.1 uF nonpolarized capacitor
1 NPN transistor 2N2222
1 2M Ohm potentiometer
1 100K fixed resistor

The small AC current generated through the microphone causes the base current to change through the transistor. This in turn changes the effective resistance of the paddles. The potentiometer is used to "tune" the circuit during program execution. After building this circuit and connecting it to the female port connector, you are ready to talk to your computer.

Vertical Blank and DMA

Every 60th of a second, whatever program that is executing in your ATARI computer is interrupted by the Operating System to perform housekeeping functions. Converting data through the microphone requires that this interruption not occur. If the vertical-blank process were not disabled, the speech would be unacceptably choppy. The ANTIC chip is continuously fetching screen data from RAM and displaying it on the TV screen. This process is called DMA. DMA also is not acceptable during operation of speech because it slows down the CPU considerably. There is also a period of time when the DMA does not occur (during vertical blank) and this also would cause an unpredictably choppy sound. The sample program turns off both DMA and vertical blank exits during sound input/output processing.

Executing the Program

The sample program will display the following **menu**:

1 TALK A BIT
2 PLAY BACK THE BIT
3 TALK A LOT
4 PRINT SUMMARY
5 PRINT THE NUMBERS
6 SAVE THE TALK
7 RESTORE THE TALK

After entering the menu number the program will ask:

WHAT SAMPLE SPEED?

Speed can be from 1–255 and higher numbers cause slower sampling and slower playback.

1 TALK A BIT

After entering the sample speed, press [START]. The screen will black out and you will have about seven seconds of speech. Adjust the potentiometer to get the best quality speech at this point. With a speed of 1, the sampling rate is about 4500 samples per second. Increasing the sample speed number will increase the speech duration but will also decrease the quality of the produced sound. The RAM buffer for the speech is 16K bytes and resides from 16K–32K in your machine. Therefore, you must have at least 40K RAM to run this program with no alterations.

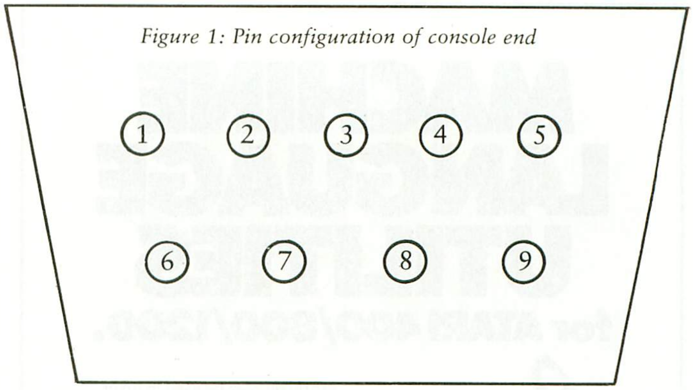


Figure 1: Pin configuration of console end

PIN NUMBER	
1–4	joystick input
5	POT B
6	trigger
7	+5 Volts
8	Ground
9	POT A

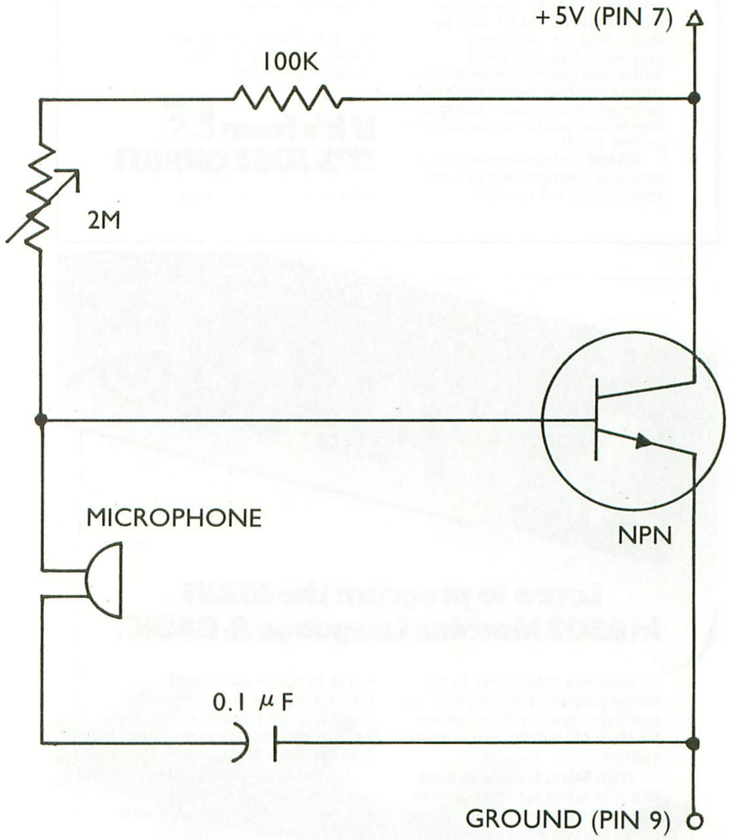


Figure 2: Diagram of voice-input circuit

2 PLAY BACK THE BIT

This will play back whatever is in the RAM buffer. Playing back with a sample speed of 1 is at least ten times faster than Chip and Dale.

continued on next page

3 TALK A LOT

This is the same as Talk A Bit, except that you can talk indefinitely and have the speech heard through the TV speaker. Press [RESET] to get out of this.

4 PRINT SUMMARY

Will cause a count of each of the numbers found in the 16K buffer to be printed.

5 PRINT THE NUMBERS

Will print all 16K worth of digitized speech.

6 SAVE A TALK

Will cause the 16K buffer to be saved to the specified file.

7 RESTORE A TALK

Will cause a saved 16K buffer to be restored to RAM. You can then use MENU item 2 to play back the restored speech.

COMPRESSION

The number coming from the POT controller is eight bits and the number sent to the TV speaker is four bits. This program has therefore packed two input voltages into a single byte in the RAM buffer. Other compression techniques such as compression of like characters and Hamming Codes would have to be implemented if this method of generating speech were to be fully implemented.

ATARI D / A CONVERTER

The ATARI computer has built into it a four-bit D / A converter for each of the four audio-output voices. By setting the proper switch this program has used audio channel number one in this mode.

This in no way affects what is happening in the other three voices. Setting address $D201 to a $1X causes X to be output to the TV speaker as voltage. X can be a number from zero to fifteen. Each different X sent to this address causes the TV speaker cone to be moved in or out. If these X's are sent fast enough to $D201 then the speaker cone moves very fast and we have sound at frequencies we can hear. This is exactly what our program does with its digitized input.

CONCLUSION

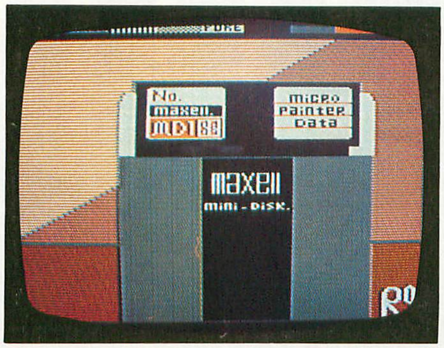
This technique is quite inexpensive and gives one a taste of the machine, its capabilities and limitations. It is fairly easy to implement and the results are reasonably satisfactory. However, if excellent speech is desired it is necessary to obtain a high-quality A / D converter for accurate digitization. To the best of my knowledge there is no commercially available A / D for the ATARI computer yet. When this item becomes available you will have a head start with the experience you may have gained using the technique outlined here, and you may more thoroughly understand the workings of your ATARI computer.

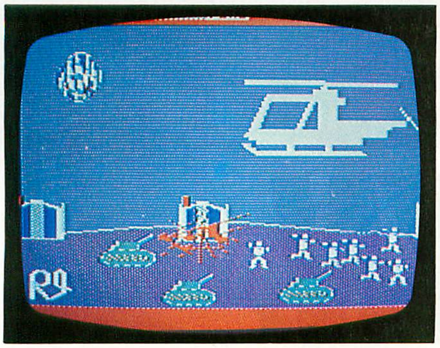
microscreens

Microscreens is a new "column" in ANTIC, intended to showcase the artistic accomplishments created by our readers with the ATARI. The column was stimulated by our receipt of a disk full of images made by Ralph Iskaros with Micropainter (DataSoft).

Ralph, an accountant and former football player, apparently did not think of himself as an artist, but just did the screens for fun. We were so impressed, we asked him to submit more screens on a continuous basis, as a start for the column. He also agreed to help us coordinate and improve the column as the months go by, and disqualified himself from our cover contest, since it might appear that he had an unfair advantage.

We welcome all of your efforts at computer art, and will publish a few of the best each month. Submissions should be on media (which we will return, *if* accompanied by a *postage-paid return mailer*). A short description of special techniques used to make the picture may be published, if appropriate. Contributors whose work is published will be compensated at our standard "art" rates.









GWENDOLYN.

THERE ARE SOME THINGS YOU KEEP SEARCHING FOR, BEYOND REASON.

Kidnapped in revenge and locked in hatred somewhere deep beneath your castle, is your princess.

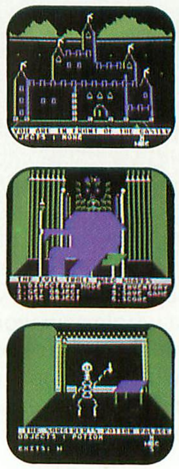
Gwendolyn.

The prosperity of your kingdom, the end of a bitter feud, your very future depend on finding her.

You swear that no obstacle can stop you. But the high-resolution, 3-D graphics, animation and sound effects make the obstacles that await you more formidable than you can imagine.

And with over ninety different screens and two full sides of play, those obstacles and the decisions you must make can appear endless. In fact, you may have to endure hours of searching to rescue Gwendolyn.

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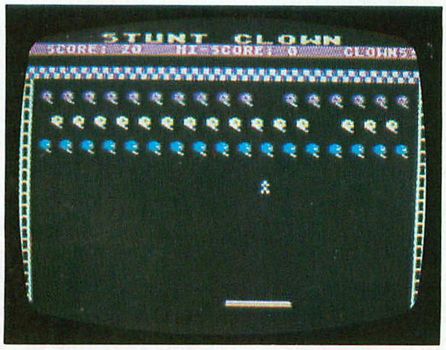
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STUNT CLOWN

by JOHN MAGDZIARZ

Welcome to the 17th annual Stunt Clown competition. You have been chosen from among all the finalists to participate in the most dangerous stunt of the competition. Your part in this event is to help Fearless Freddy pop balloons that are floating above the circus floor. To do this you must maneuver a trampoline under Freddy so that he can make enough successful jumps to pop all the balloons. But, WATCH OUT!. The demented Dr. Norton has his own plans for this event. Since he is the present record holder for the Stunt Clown competition, he will go to any length to keep his record . . . and he has. The evil doctor has arranged for an unlimited supply of balloons to be released, and from time to time he will magically shrink the trampoline.



Victory and Freddy's health rest in your hands. The unsuspecting crowd cheers as the rigmaster appears and shouts, "Let the stunts begin!".

ABOUT THE GAME

Stunt Clown is a one-player game using a Joystick in Port One. To start the game and launch a clown, press the trigger. The trampoline is moved left and right with the Joystick. Each new game starts with three Stunt Clowns. An extra Stunt Clown is awarded every 500 points. Allowing a clown to hit the ground disqualifies that clown from the competition. When all but seven of the balloons are popped, a new lot is released and your trampoline is shortened. The game ends when you have no clowns left.

PROGRAM DESCRIPTION

Lines 110-300: Joystick read and collision checking
Lines 310-340: Balloon pop routine
Lines 360-370: Extra clown check
Lines 430-450: Fallen clown Routine
Lines 460-510: Game end sequence
Lines 520-600: Paddle size change
Lines 610-660: Title page set up
Lines 670-760: Variable initializations
Lines 770-830: Machine language character set move routine
Lines 840-960: Redefine characters
Lines 970-1130: Screen data and display
Lines 1140-1160: Ambulance sound routine

Changable Parameters

To change number of clowns: Variable CL in line 1070

To change balloons left before round change: Variable BAL In line 340

To change points needed to get extra clown: Change '490' in line 360

```
70 REM ........STUNT CLOWN...........
80 REM ........by John Magdziarz......
90 REM ........(c) COPYRIGHT 1983.....
100 GOSUB 620
110 GOSUB 1180:IF STRIG(0)<>0 THEN 110
120 CX=INT(RND(0)*32)+5:POSITION CX,15
:? "$":CYI=-1:CXI=1:CY=15
130 REM *** JOYSTICK READ ROUTINE ***
140 S=STICK(0):IF S<>11 AND S<>7 OR S=
15 THEN 200
150 IF S=7 THEN NP=PP+2:CH=1:PAD$=PADR
$:IF NP>ED THEN NP=ED
160 IF S=11 THEN NP=PP-2:CH=-1:PAD$=PA
DL$:IF NP<2 THEN NP=2
170 IF S<>LS THEN POSITION PP,21:? PAD
$:LS=S:GOTO 190
180 LS=S:POSITION NP,21:? PAD$:PP=NP
190 IF RND(0)>0.85 THEN CH=0
200 IF SET THEN SET= NOT SET:CYI=-1
210 CPY=CY+CYI:CPX=CX+CXI
220 LOCATE CPX,CPY,Z:POSITION CPX,CPY:
PUT #6,Z
230 IF CY>21 THEN 440
240 IF Z=32 THEN 410
250 IF Z<>37 AND Z<>38 AND Z<>32 AND Z
<>169 THEN 320
260 FOR I=15 TO 0 STEP -5:SOUND 0,0,2,
```

continued on page 71

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STUNT CLOWN *continued from page 69*

```
I:NEXT I
270 IF CX=36 AND CY>3 THEN CXI=-1:CPX=
CPX-INC:GOTO 380
280 IF CX=2 AND CY<21 THEN CXI=1:GOTO
380
290 IF CY=3 THEN CYI=1:GOTO 380
300 IF CY=20 THEN CYI=-1:CXI=CH:INC=1:
CPX=CPX+INC:POSITION CX,CY:? " ":CX=CX
+INC:GOTO 380
310 REM *** BALLOON POP ROUTINE ***
320 SET=1:CXI=CXI*-1:SC=SC+IN:POSITION
 10,0:? SC:BAL=BAL-1:FOR I=16 TO 0 STE
P -4:SOUND 1,50,0,I:NEXT I
330 SC2=SC2+IN
340 IF BAL=7 THEN 530
350 REM *** EXTRA CLOWN ROUTINE ***
360 IF SC2>490 THEN SC2=0:CL=CL+1:FOR
I2=1 TO 5:SOUND 0,10,10,8:FOR I=1 TO 5
:NEXT I:SOUND 0,0,0,0:NEXT I2
370 POSITION 38,0:? CL:GOTO 410
380 IF CPY>20 OR CPY<3 THEN CPY=CY
400 IF CPX>36 OR CPX<2 THEN CPX=CX
410 POSITION CX,CY:? " ":POSITION CPX,
CPY:? "$":CX=CPX:CY=CPY
420 GOTO 140
430 REM *** FALLEN CLOWN ROUTINE ***
440 CL=CL-1:POSITION 38,0:? CL:POSITIO
N CX,CY:? "(":FOR T2=1 TO 3:GOSUB 1140
:NEXT T2:SOUND 0,0,0,0:FOR A=0 TO 36
450 POSITION A,22:? " QB":FOR T2=1 TO
17:NEXT T2:NEXT A:POSITION 36,22:? "
":IF CL<>0 THEN 110
460 REM *** GAME OVER ROUTINE ***
470 GOSUB 580:POSITION 0,1:FOR X=8 TO
3 STEP -2:FOR I=3 TO 36:SOUND 0,I,10,8
:POSITION I,X:? " ":NEXT I:NEXT X
480 SOUND 0,0,0,0:POKE 53279,0
490 FOR I=15 TO 36:POSITION I,0:? " ":
NEXT I
500 IF PEEK(53279)<>6 AND STRIG(0)<>0
THEN POSITION 16,0:? "GAME OVER! PRES
S START":GOSUB 590:GOTO 500
510 SOUND 0,0,0,0:SOUND 1,0,0,0:GOSUB
1070:GOTO 110
520 REM *** PADDLE SIZE ROUTINE ***
530 TIM=TIM+1:FOR IZ=3 TO 36:POSITION
IZ,21:? " ":NEXT IZ
540 IF TIM=1 THEN PADR$="  %%%%":ED=31
:PADL$="%%%%  ":IN=30:GOTO 560
550 IF TIM=2 THEN PADR$="  %%":ED=33:P
ADL$="%%  ":IN=50
560 POSITION CX,CY:? " "
570 POSITION PP,21:? CL2$:GOSUB 1100:G
OTO 110
580 FOR IZ=3 TO 36:POSITION IZ,21:? "
":NEXT IZ:RETURN
590 SOUND 0,200,10,8:SOUND 1,199,10,8
600 RETURN
610 REM *** TITLE PAGE ROUTINE ***
620 GRAPHICS 1+16
630 POSITION 4,8:? #6;"* STUNT *"
640 POSITION 5,10:? #6;"* CLOWN *"
650 POSITION 8,17:? #6;"BY"
660 POSITION 2,18:? #6;"john magdziarz
"
670 REM *** VARIABLE INITIALIZATIONS **
*
680 DIM ROW1$(34),ROW2$(34),ROW3$(34),
TP$(39),SD$(60),PAD$(8),CL$(8),CL2$(6)
:POKE 82,0
690 DIM PADR$(8),PADL$(8):FOR I=1 TO 3
2 STEP 2:ROW1$(I,I+1)="# ":NEXT I
700 FOR I=1 TO 34 STEP 2:ROW2$(I)=CHR$
(39):ROW2$(I+1)=CHR$(32):NEXT I
710 FOR I=1 TO 34 STEP 2:ROW3$(I)=CHR$
(167):ROW3$(I+1)=CHR$(32):NEXT I
720 FOR I=1 TO 37:TP$(I,I)="&":NEXT I
730 FOR I=1 TO 57 STEP 3:SD$(I)=CHR$(2
9):SD$(I+1)=CHR$(30):SD$(I+2)=CHR$(169
):NEXT I
740 PADR$="  %%%%%%":PADL$="%%%%%%  ":
PAD$=PADR$
750 FOR I=1 TO 8:CL$(I,I)=" ":NEXT I
760 CL=3:SC=0
770 REM *** MACHINE LANGUAGE CHARACTER
 SET MOVE ROUTINE ***
780 FOR M=0 TO 59:READ Q:POKE 1536+M,Q
:NEXT M
790 DATA 169,0,133,205,133,203,133,207
,169,224,133,206,104,104,104,133,204,2
4,165,207,105,1,133,207,201,5
800 DATA 240,26,160,0,177,205,145,203,
200,208,249,24,165,204,105,1,133,204,2
4,165,206,105,1,133,206,76
810 DATA 17,06,165,208,141,244,2,96
820 POKE 559,0:POKE 106,PEEK(106)-5:ST
CHR=(PEEK(106)+1)*256
830 C=STCHR/256:D=USR(1536,C)
840 REM *** REDEFINE CHARACTERS ***
850 FOR COUNT=1 TO 9:READ OLD:NC=OLD*8
860 FOR CHANGE=0 TO 7:READ NUM:POKE ST
CHR+CHANGE+NC,NUM:NEXT CHANGE:NEXT COU
NT
870 DATA 3,20,85,81,85,85,20,8,2
880 DATA 4,32,32,184,48,16,16,136,136
890 DATA 5,0,0,255,85,255,85,0,0
900 DATA 6,250,250,250,250,175,175,175
,175
910 DATA 7,60,255,251,255,255,60,8,2
920 DATA 8,136,136,16,16,48,184,32,32
930 DATA 9,65,65,65,85,85,65,65,65
940 DATA 49,170,174,191,174,170,170,48
,48
950 DATA 34,168,168,130,130,170,170,14
,12
960 ? :POKE 756,STCHR/256:POKE 559,0
970 REM *** SCREEN DATA AND DISPLAY DA
TA ***
980 DL=PEEK(560)+PEEK(561)*256
```

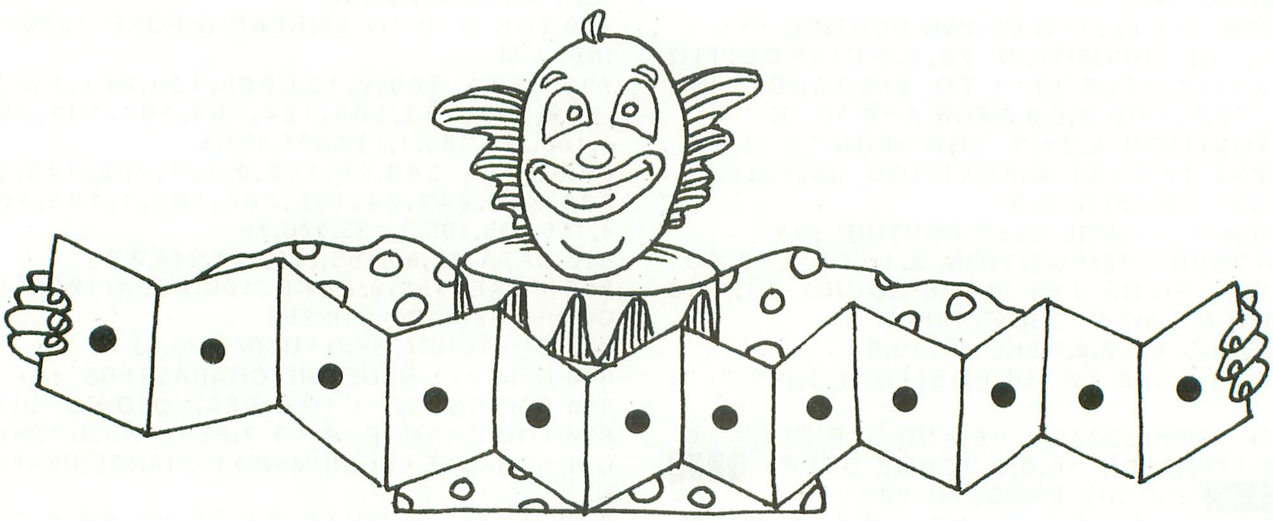
continued on next page

```
990 POKE DL+3,70:POKE 87,1:FOR I=DL+7
TO DL+29:POKE I,4:NEXT I
1000 POSITION 4,0:? #6;"STUNT CLOWN"
1010 SS=PEEK(88)+PEEK(89)*256
1020 SCR=SS+20
1030 HI=INT(SCR/256):LO=SCR-HI*256
1040 POKE 88,LO:POKE 89,HI:POKE 87,0
1050 FOR I=708 TO 712:READ COL:POKE I,
COL:NEXT I:POKE 752,1
1060 DATA 26,10,68,134,0
1070 CL=3:POSITION 3,0:? "SCORE:
HI-SCORE:     CLOWNS: ":IF SC>HS THEN
 HS=SC
1080 TIM=0:IN=10:SC2=0:ED=29:SC=0:POSI
TION 1,2:? TP$:POSITION 2,2:? SD$:POSI
TION 38,2:? SD$
1090 PADR$=" %%%%%%":PADL$="%%%%%% "
:PAD$=PADR$
1100 POKE 559,34:POSITION 3,4:? ROW2$:
POSITION 4,6:? ROW1$:POSITION 3,8:? RO
W3$
1110 PP=18:POSITION PP,21:? PADR$
1120 BAL=50:POSITION 10,0:? SC:POSITIO
N 25,0:? HS:POSITION 38,0:? CL
1130 RETURN
1140 FOR I4=110 TO 30 STEP -5
1150 SOUND 0,I4,10,8:FOR T=1 TO 2:NEXT
 T:NEXT I4
1160 FOR I4=30 TO 110 STEP 5:SOUND 0,I
4,10,8:FOR T=1 TO 2:NEXT T:NEXT I4:RET
URN
1180 XX=PEEK(16):IF XX<128 THEN 1220
1200 POKE 16,XX-128:POKE 53774,XX-128
1220 RETURN
```

TYPO TABLE

Variable checksum = 1903510

Line num range	Code	Length
70 – 170	MC	523
180 – 290	PN	446
300 – 370	IO	511
380 – 470	CJ	543
480 – 550	GF	528
560 – 670	ZM	444
680 – 740	SA	534
750 – 830	HM	519
840 – 950	OR	424
960 – 1070	ZA	545
1080 – 1160	BJ	554
1180 – 1220	OV	87

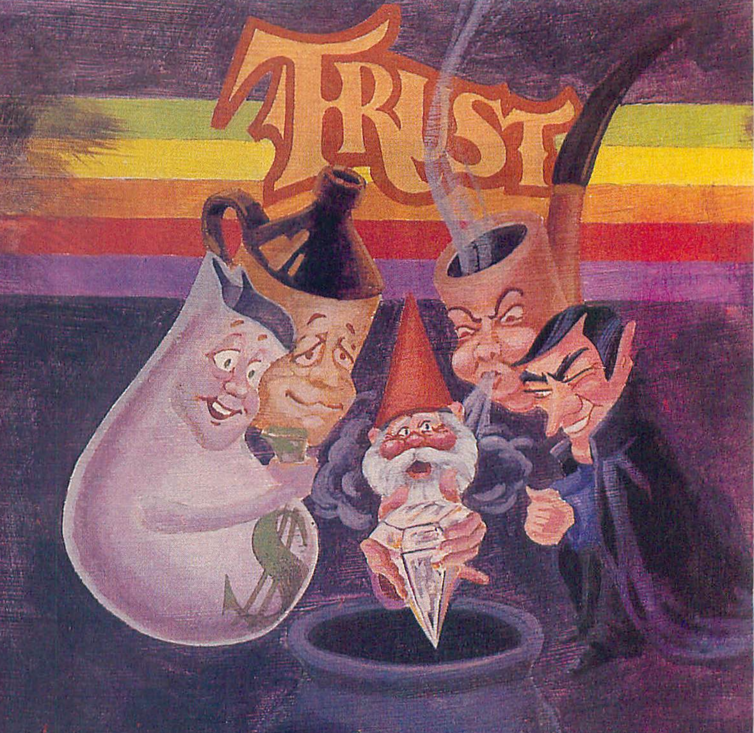


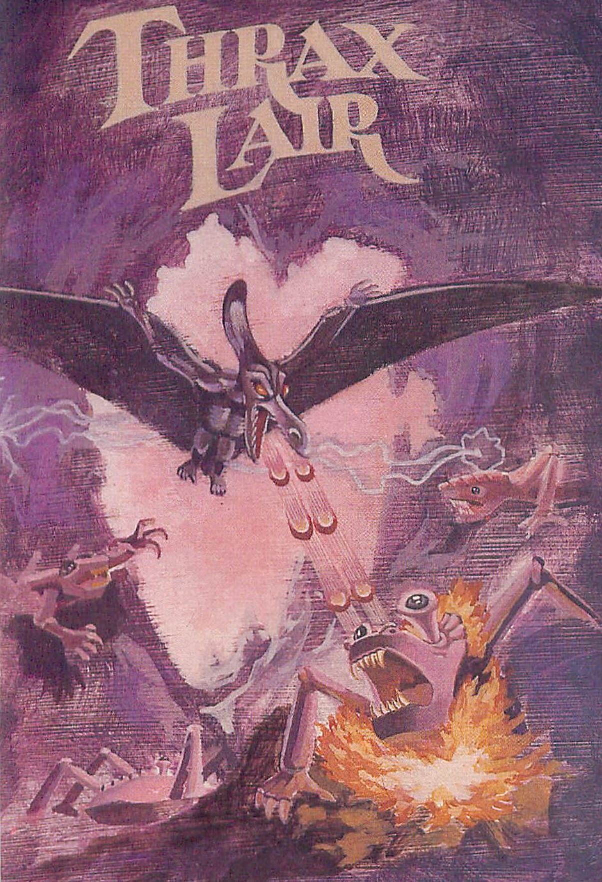
WHAT IS A TYPO TABLE?

Newcomers to ANTIC may wonder about the "Typo Table" that appears at the end of most of our BASIC listings. TYPO is a program that helps you find typing errors made when entering programs that appear in ANTIC. TYPO will produce a table of values which can be used to pinpoint where an error was made. The TYPO program and instructions originally appeared in Volume 1, Number 3 of ANTIC, and was reprinted in Volume 2. The latter issue is still available as a back issue, and the TYPO program itself is included in ANTIC UTILITIES DISK #2. Also, you can obtain a copy of the article by sending a stamped self-addressed envelop to: ANTIC, 600 18th Street, San Francisco, CA 94107. Regretfully, we cannot fulfill requests unless a self-addressed stamped envelope is included.

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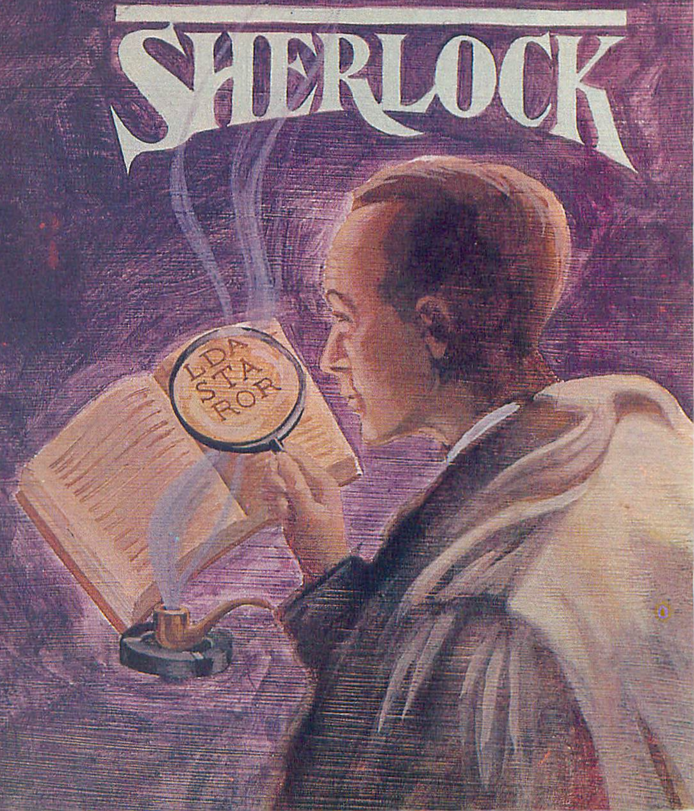
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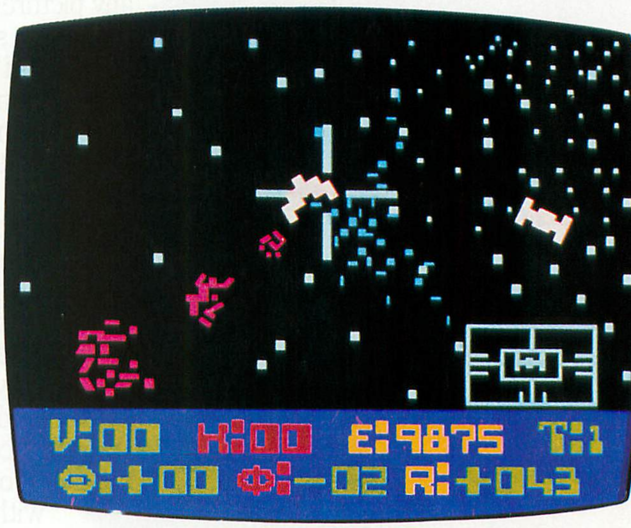
by JOE HAFNER

When NASA trains astronauts for space missions they create a closed environment, called a Space Flight Simulator, which closely resembles the conditions of space. One of the most sophisticated elements of this simulator is the Computer General Imagery equipment, which projects a view of the stars and planets onto the capsule window as if the capsule were actually in space. The visual effects are very real, and the equipment used to create the projections costs several million dollars.

For the cost of a **Star Raiders** cartridge, we who are earthbound can also experience the thrill of space travel, including intergalactic confrontations, docking maneuvers, and warps through hyperspace. The visual effects here are also very real, especially when you add a dash of imagination.

The game of Star Raiders was conceived and implemented at Atari by Dave Neubauer, who also designed the POKEY chip. At the time of its design, early in 1979, it was one of the largest games written, requiring 8K of ROM storage. When the technical and marketing people at Atari saw Star Raiders in action for the first time, they knew it was a winner, and took great pride in being able to present the game to the public.

Star Raiders is a conceptually sophisticated game, involving timing, strategy, and three-dimensional geometry, as well as the usual aiming accuracy and quick reflexes characteristic of most arcade and video games. As such, it is basically a real-time adventure game. For all of its sophistication, however, the game still follows the Atari policy of providing a clear, unambiguous, and responsive control interface between man and machine, which means that it is easy to learn and to play. The ten-page manual supplied with the game clearly indicates the use of the controls and the screen displays. It also describes the four levels of play, the scoring mechanism, and some of the strategies useful for getting through a mission. In this article we will examine some of the more intricate game-playing techniques to help you get a better start at becoming a Star Raiders master.



The premise of the game is simple. You are a lone Atarian Starship attempting to save a number of remote starbases from a horde of attacking enemy Zylon ships. The enemy tries to surround and destroy your starbases to obtain raw material for building new Zylon warships, while destroying all forms of humanoid life in the process.

If you are a beginner at the game, play at the Novice Level. This is also a good place for young children to play. At the Novice Level you have time to learn the operation of the major controls, the joystick, the indicators, and the several screen displays. With your shields up your ship cannot be damaged, and the Zylons will always seek you out. In the higher levels of play you may have to actually track down a Zylon in order to engage and destroy it.

Joe Hafner is an electronics design engineer and occasional teacher of programming. Having mastered Star Raiders, he offered to share his expertise with us.

The theoretical maximum rating in Novice Level is a Warrior rank, but in actual play a Lieutenant rating is as well as can be expected. If you consistently get an Ace or Lieutenant rating at the Novice Level then it's time to move up to the more interesting levels. By that time you should have a good understanding of the controls, and the attack pattern of the aliens.

The Pilot Level, one step up from Novice, will first introduce you to steering through hyperspace. This can be confusing at first, but needn't be if you understand the concept. On the forward screen you will see the large crosshairs which are put there by your Attack Computer. In the center you will recognize from the Novice Level the smaller cross which is the hyperwarp target marker. In the higher levels of play the hyperwarp target marker tends to drift around.

Actually, you must imagine that your ship is drifting, and the marker is fixed. Your steering corrections on the joystick are really attempts to move the Attack Computer crosshairs, which are drifting, over the hyperwarp target marker, which is fixed relative to space geometry. Therefore, if the marker is above the crosshairs, your ship has drifted low, and you must pull back on the stick to raise the crosshairs. If the marker is left of center, then move the stick left to compensate. Remember you are steering the crosshairs, not the hyperwarp target marker.

Another game feature which you will need to understand in the higher levels of play is the Long Range Scanner. It shows the position of the enemy ships in a sector in relation to the position of your space ship. However, it is not always obvious, because of the three dimensional nature of a sector, where exactly the enemy is situated.

In order to understand the Long Range Scan you have to understand simple projection geometry. Think of the sector as a clear ball with your ship in the center and the Zylons anywhere else within the ball. Now slide a flat plate of glass right through the center of the ball, so that your ship is sitting on the glass as if it had landed there. Place the ball on the ground, with the glass plate perfectly horizontal, and stand directly above the ball. Now, from the position of your eyes, draw a straight line down through the Zylon position and onto the glass plate. This is shown as a side view in Figure 1. Even though the actual Zylon position is at point A, its apparent position on the Longe Range Scan is point B, which always seems closer than it actually is.

Now consider what happens when you pull back on the stick and cause the glass plate to rotate until it touches the Zylon. The Zylon position is accurately indicated on the Long Range Scan. The Scanner effectively collapses all points inside the clear ball so that they lie directly on the glass plate, but without rotating the plate. Incidentally, you will notice the same effect, which is technically known as vector projection, also occurs for the range indicator, which only indicates accurate range values when the target is directly ahead. This is when the Θ and Ø indicators are both zero. You can get a good understanding of these effects by flying around in a sector which has a starbase and observing the Long Range Scan and range indicator as you adjust the position of your ship with the joystick.

In any good spacecraft design there are backup systems available to get you to safety in case your ship is damaged. This is also true in your ship. Only loss of photon torpedos can totally prevent you from engaging and destroying Zylons. Your Long Range Scanner and Attack Computer are complementary. You can use one in place of the other at a reduced efficiency level. Your impulse and hyperwarp engines cannot be damaged, so you can always get to a starbase sector when necessary.

If your impulse engines are destroyed and you need to catch a Zylon who is beyond range, line up the target with either the Attack Computer or the Long Range Scan, and engage hyperwarp. Do not just make steering corrections, but do abort the hyperwarp just before leaving normal space, or if the target is sighted. This should put you in range for a battle.

Even if your Subspace Radio (which receives Zylon position information for the Galactic Chart) is destroyed, you can use your knowledge of Zylon movement patterns to search out their current positions without going to a starbase for repairs.

Being able to battle Zylons with reduced system efficiency is an important means of increasing your rating. This is because it takes time to get to a starbase sector, dock, and wait for repairs from the shuttle craft. Time is a negative factor in computing your rating, and each docking maneuver decreases your score by a few points. There is usually time for no more than five or six docking maneuvers at the highest level of play, the Commander Level, and still hope for a Star Commander Class 1 rating, the highest obtainable.

You must get used to operating with damaged or destroyed sytems in order to get maximum ratings. With practice you should be able to steer through hyperspace without your Attack Computer crosshairs, and still be able to hit your target sector most of the time. This skill is essential when you are trying to dock at a starbase to get your destroyed computer repaired; you have very little hope of completing the mission without this skill. Part of the strategy of the game is knowing how much damage you can sustain before docking for repairs becomes the most prudent choice. There are no pat answers for this, and each individual commander must make his own decisions. It's lonely at the top!

Another element of this game is quick thinking under pressure. Consider this scenario: Your photons and your shields are destroyed, as well as your Subspace Radio, so you decide to dock for repairs. Without the Radio, you cannot be sure of the Zylon positions, so you choose a starbase which appears safe from imminent destruction. You manage to dock successfully, and the repair shuttle craft begins to approach your ship. Without warning, the starbase on your screen explodes into a million pieces taking

continued on next page

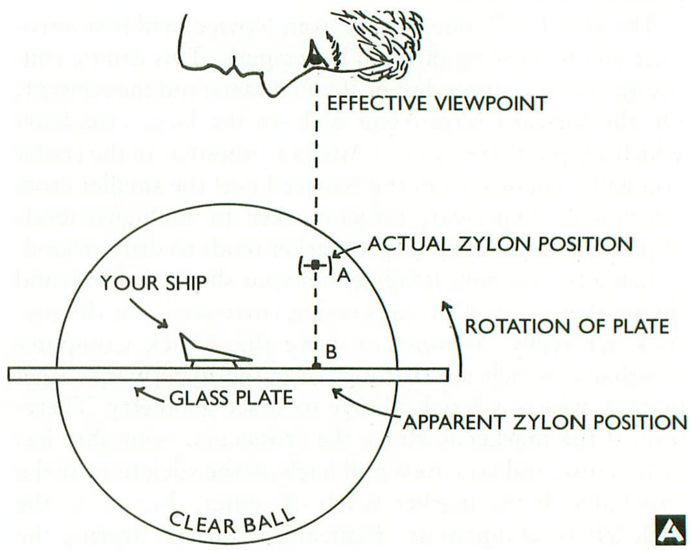
the repair crew with it. The starbase was surrounded after all! The Zylons are fast builders, and instantly build two new warships from the starbase debris, and begin to attack your defenseless ship. You have only a few seconds to make the right decision, touch the appropriate controls, and (possibly) live to tell the tale to other commanders back at Starfleet Headquarters. Survival in situations like this separates the rookies from the veterans.

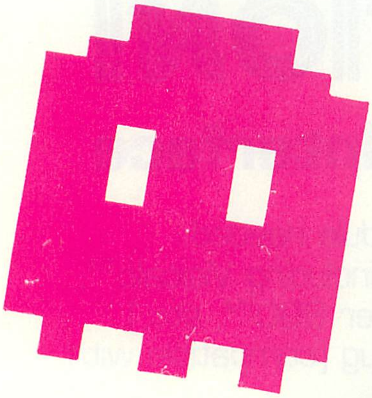
As your skill improves you may find yourself getting the maximum rating more and more often. So what do you do for more challenge? Try these game variations. Play Novice or Pilot Level missions without shields. Try a Warrior or Commander Level, but allow the Zylons to destroy one or more of your starbases. Play an entire game without using the impulse engines. Or simply give the Zylons a one or two minute head start before you start attacking them.

It's also fun to play a two-player game, where one Atarian runs the joystick and another runs the keyboard controls. This is a good way to play when friends who are not familiar with all the game features want to play. Be sure to decide beforehand who gets to be captain. The heat of battle is no time to debate the issue!

When you get really familiar with the game, and you're looking for a new thrill, try hooking up to a large projection TV system. The effect is awesome. With the Star Raiders manual and these few tips you should soon be saving galaxies like a seasoned starship commander.

Figure 1.
SIDE VIEW OF THE SECTOR SCANNER



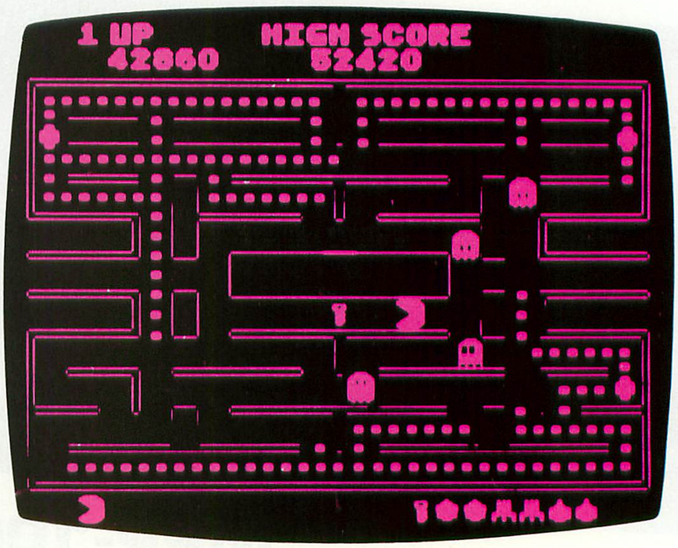


PacMan

by ROBERT CAPPARELL, M.D.



I could play Pac-Man all day. In fact I did. Atari's 5200 **Pac-Man** is the gold standard for all home video maze games, and certainly rivals its arcade counterpart in all important aspects.



Visually it is colorful, without the flashes we saw on the VCS version, and the figures are distinct, with each ghost having a personality all its own. The 5200 version is horizontally laid out, in contrast to the vertical screen in the arcade game. This in no way detracts from the play. In fact, I found that patterns that worked in the arcade won't work on my 5200 version, so the learning process, and the fun of playing are actually increased.

If you're a Pac-Man junkie, then you'll enjoy the option of starting at a very high level of play (e.g. key-level). I found it very useful to practice patterns at higher levels so that when I started at the lower ones, I didn't get hung up for prolonged periods at the melons or bells.

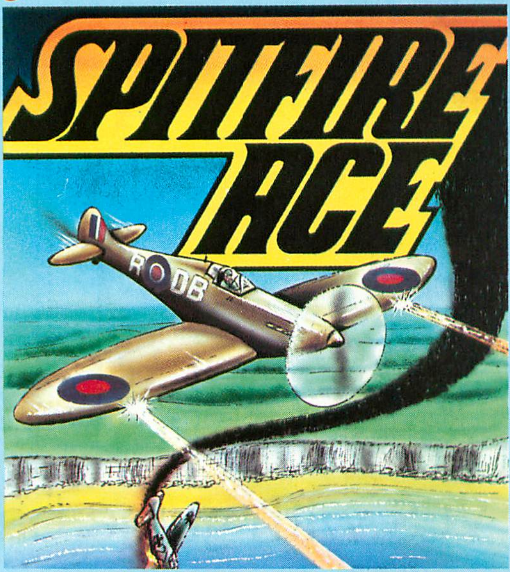
I'm convinced Pac-Man was the beginning of the so-called "cute games" so popular in arcades today. In fact, it started more than one trend. For some reason, (certainly with Freudian overtones), women started filling the arcades to play Pac-Man. It's the only home game my wife plays frequently. Some of the best players I've seen are women. Perhaps it's the passive-aggressive nature of Pac-Man, where there is no shooting, but after eating a power pill, one can chase and eat the previously antagonistic ghosts, for bonus points of course.

I have a few tips for beginners that will help you reach the upper levels. When starting out, the first two boards (cherries) should be cleared quickly, without becoming greedy. The object is to reach the higher levels with a bonus Pac-Man, awarded at 10,000 points, without losing any men along the way. Pac-Man is a game of patterns, and at higher levels, a workable pattern is a must to clear the board without losing a man. This takes a lot of trial and error, and fortunately not a roll of quarters. Try to avoid getting trapped in the corners without a power pill. This will almost certainly lose a man and gain nothing. Also, it is important to learn how to use the tunnel effectively to escape the ghosts on your heels. The tunnel can also be used to trap the ghosts, eat a power pill, then clear the tunnel (with a lot of practice).

The major problem I ran into, and apparently one that Atari is now confronting, is that the controllers quickly wore out during frequent use, with loss of fine control so necessary for this and other games. Fortunately, Atari has extended the warranty on the controllers alone, to June 30, 1983. So if you're having problems, take your controllers to the nearest authorized Atari Service Center. So far, my new controllers are holding up well.

In summary, Atari 5200 Pac-Man is the best translation yet of an arcade game, and will satisfy even the most hard core Pac-Man fans. I highly recommend it for children of all ages!

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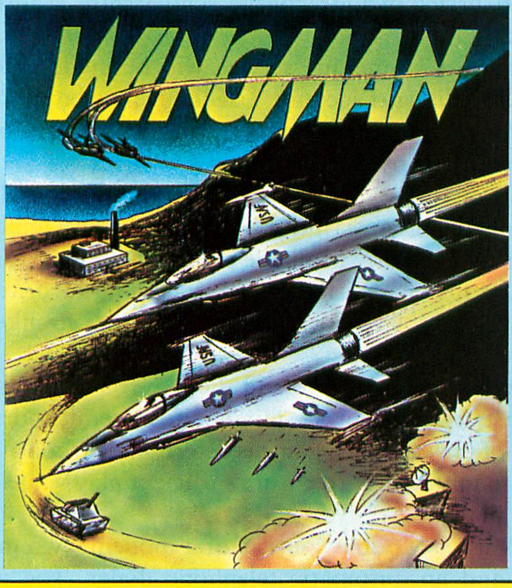




HELLCAT ACE (Pacific) and SPITFIRE ACE (Europe) are three dimensional air-to-air flying combat simulators. As the pilot, the player sits in the cockpit of a World War II fighter (either a Hellcat or a Spitfire) and uses real combat Basic Fighter Maneuvers (BFM) to gain a machine gun firing position on enemy aircraft. The pilot can maneuver for a head on, deflection, or six o'clock firing position and must compensate for aircraft velocity, "g" forces, and combat turns in a three dimensional airspace to gain 5 victories to become a combat "Ace". This is no slow, Sunday flying simulator — this is a contact, combat flying simulation where the computer controlled enemy fighter can and will out maneuver you and shoot you down! Requires ATARI, combat skills and nerves, and 40K Disk or 32K Cassette . . . $29.95.

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DIAL-A-GAME

GameLine module links VCS with game bank

by DEBORAH BURNS

Video games "by telephone" are now available to Atari VCS game machine owners through an innovative new service called GameLine. Although currently limited to games, GameLine plans other services for the millions of game machine owners who may upgrade their units with programmable adaptors such as "My First Computer" (see ANTIC, April '83).

GameLine, a division of Control Video Corporation, was started by William von Meister, who also originated The SOURCE, a phone-in data service for computers. To attract customers, GameLine will sponsor national video-game competitions with substantial prizes. These contests, plus the relatively economical cost of the service, may significantly alter the purchasing habits of the video-game market, and further extend the useful life of the VCS machines.

The key to the GameLine service is the Master Module, costing about $50. This unit is a high-speed modem, with on-board memory, that automatically dials GameLine's toll-free number and receives the selected game program. A wide range of popular games have been licensed to GameLine, and more will be added as the service grows.

In addition to the Master Module, the player must buy a GameLine membership for $15. After that, games can be loaded for about $1 each, and each game can be played five to ten times per load. This enables a player to test-play games before purchasing them in cartridge form, or to just play at a cost less than at the arcades.

Proficient players may want to compete in GameLine tournaments. The Master Module can record and upload game scores to the central computer, where scores on specific games can be compared and winners determined. Competition costs an additional 50 cents per game-load, but promised prizes include college scholarships, sports cars and gold bullion.

Charges for GameLine service will be made automatically to a credit card account. Use limits may be established by customers to control game-playing by children or even to regulate their own habits.

Upon joining, GameLine members receive complete instructions and a subscription to GAMELINER magazine, that lists all currently available programs. So far, there are more than fifty game titles listed, including favorites such as Demon Attack, Miner 2049er, Atlantis, Frankenstein and Fast Food.

Depending on the game and the player's skill, a session could last from about 15 minutes to several hours. The number of plays of each game is determined in consultation with its manufacturer to ensure sufficient play value for the average player.

The Master Module consists of a modem, two memory devices and an automatic telephone dialer. The modem transmits and receives data at variable rates of speed (900–1800 baud) to overcome any problems with telephone line interference or delays. One memory unit (8K RAM) is used for temporary storage of video games data or up to six typewritten pages of textual information received from CVC's

continued on page 84



DISKEY

by Sparky Starks

Potential into practical reality. This is the core of DISKEY — a remarkable utility program that gives ATARI disk drive owners the flexibility to accomplish tasks that other utilities either ignored or only hinted at. With DISKEY, the user will be able to actually examine a disk and its directory, and repair some files that might otherwise have been lost. DISKEY also performs a multitude of other practical functions, including the following:

- ★ Automatically lists any unreadable or destroyed sectors
- ★ Sends contents of disk to printer selectively
- ★ Up to four separate drives may be addressed
- ★ Can be used to backup some of those "unbackupable" disks
- ★ Allows direct examination of any file
- ★ Over 50 separate key functions available

As an ATARI 400 or 800 owner, you have extraordinary power and versatility at your disposal. Tap into those resources effectively with DISKEY — new from Adventure International.

ATARI 400/800 32K DISK
052-0158 $49.95
(Note: Some features will require 40K)

SOME OF DISKEY KEY FUNCTIONS

A	Clear screen and filename
B	Byte compare, D1 to D2, OS to DS
C	Copy sectors, OD to DD, OS to DS
D	Toggle destination drive
E	Erase disk (format)
F	Select file sub-menu
L	Set automatic function lower limit (OS)
M	Modify Sector Map
N	New destination sector
O	Toggle originate drive
P	Print screen to printer
Q	Query (search for hex key, drive OD, sector OS to DS)
R	Read new OS, set DS to match
S	Search for ASCII key, drive OD, sector OS to DS
T	Tape to disk
U	Upper case conversion of printer lower case
V	Toggle write verify
W	Write memory buffer to sector DS, drive DD
X	Select EOR Sector Map screen print mask
Z	Zero memory buffer
+	Read upward, next sector on disk
–	Read downward
?	Directory information
!	Select directory sub-menu
cB	Byte compare, D1 to D2, whole disk
cC	Copy D1 to D2, whole disk
cD	Decimal to hex, ASCII conversion
cE	Erase disk (without new format)
cF	Modify sector forward sector chain reference
cH	Hex to decimal, ASCII conversion
cL	Locate bad sector on drive OD
cN	Modify sector file number reference
cO	Select one-drive functions sub-program
cP	Print current Disk Map
cR	RPM test drive OD
cS	Special file copy, no directory reference from source
cV	VTOC update and repair, drive OD
cY	Toggle Sure Response prompt enable
FA	File binary load address headers to printer
FD	Delete file
FF	Select filename for all file functions
FL	Lock file
FM	Show memory address load position in file
FQ	Relative Query
FR	Rename file
FS	Relative Search

BASIC ROUTINES FOR THE ATARI

by Jerry White

Finally, a self-help system that cuts through the stuffy technical jargon and allows the user to learn effective programming techniques fast! BASIC ROUTINES FOR THE ATARI has been written especially for ATARI 400 or 800 users who wish to write programs in BASIC. This package comes complete with an extensive manual and your choice of a tape or disk which contains all of the routines from the manual — which means you'll be able to actually see each of them in action on your ATARI. Some of the BASIC routines include joystick, sound, player missile strings and much more — and presented in a way that you'll quickly be able to learn and apply to your own programs.

If your programming ability lies somewhere between beginning and advanced, then look no further — BASIC ROUTINES FOR THE ATARI is the system for you.

BASIC ROUTINES book with 16K TAPE
051-0154 $24.95
BASIC ROUTINES book with 24K DISK
052-0154 $24.95

Published by Adventure International

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To order, see your local dealer. If he does not have the program, then call 1 (800) 327-7172 (orders only please) or write for our free catalog.

DIAL-A-GAME *continued from page 82*
central computer.

An additional battery-powered memory stores the player's name, personal identification number, the serial number of the Master Module and best contest scores. The automatic telephone dialer remembers the local or toll-free numbers for CVC's central computer and whether to use tone or pulse dialing. Most modems with these features would cost many times more than the Master Module.

Basically, the Master Module is inserted into a game console like a cartridge and connects to a telephone outlet. When you choose a game, the Module will call the host computer and load the game in less than a minute. You can either look up the game in the magazine or select it from the electronic menu that appears when you first hook up to GameLine. Once the game is transmitted and stored in your unit's memory (8K RAM in the Master Module), the phone is free to be used again and the game is played exactly as it would be with a conventional cartridge.

According to John Kerr, vice president for sales and marketing, CVC will have two contests a month which will give the players the chance to see how they measure up against other players. "Scores will be stored in our computer," he said. "If a player wants to enter his score, he will see immediately where he ranks locally, regionally and nationally. For competition purposes, we have divided the country into 20 geographic regions, each approximately equal in population.

Prizes for the winners of these competitions range from certificates and free game-plays on the GameLine system to the first "video game" college scholarship, world-class sports cars and ultimately to a World Video Game Championship award of an expected $100,000 in gold.

GameLine is just the first of a range of telecommunications services that Control Video Corporation plans to offer. William von Meister, founder, president and chief executive officer of CVC, and developer of The SOURCE, hopes to reach the 12 million VCS owners in the U.S. who may feel their unit has limited use. He envisions a number of services that include electronic mail, news and information, home banking and financial management — all currently available for microcomputer users but yet to come for VCS owners.

"In effect, we are turning those dedicated game units into multi-purpose communications terminals and bringing the benefits of sophisticated computers within the reach of the average household," said von Meister. "A video game console can now be a real teaching machine.

"Several video game manufacturers have announced their intentions to develop add-on equipment which will turn game units into small computers," he continued. "Our system leaps ahead of those add-ons to tie VCS and compatible units into a national telecommunications network fed by the power of a large central computer's data base."

So, home game players, take heart. The VCS is not dead yet. As Dan Gutman said in the last issue of ANTIC, "Video game designers, with an eye on those millions of units out there, have been forced to use their ingenuity to squeeze every last ounce of capability out the Atari VCS." Control Video Corporation is certainly one of those companies.

Extra Atari Enjoyment NOW

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DEMON ATTACK

by Dave Johnson from Imagic

Marooned on the ice planet Krybor, watch eerie creatures stream overhead and hover ominously. Attack and destroy them—or be destroyed! For 1-2 players with ever increasing dangers. Blast 'em and survive!

41656 ROM Cartridge ~~$39.95~~
$31.96 20% Off Til July 10

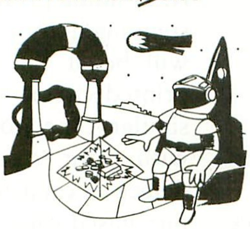


BURIED BUCKS

from Analog

Fast action "daredevil" game! Equipping your helicopter with explosives, you intend to blast the gold. But your arch-enemy plans to keep the treasure and you buried by dropping loads of dirt from his World War II bomber. Incredible 99 levels of joystick controlled action for 1-2 players. It's a race for the bucks as you avoid the falling dirt!

32364 16K Tape or 35873 16K Disk ~~$29.95~~
$23.96 20% Off Til July 10



JOURNEY TO THE PLANETS

from JV Software, Inc.

Space, adventure and arcade action game. Disembark on inviting planets — a different adventure awaits on each planet. Designed for your puzzle solving intellect enhanced by arcade action for excitement.

43568 32K Tape or 43579 32K Disk $29.95

MY SPELLING EASEL



by Al P. Casper from APX

Paint landscapes by typing letters and spelling words. Non-readers can make pictures by touching any key. Young readers are challenged to type a whole word and display its picture. 4 levels, ages 3-10. Requires Atari Basic; joystick optional.

16K Tape or 24K Disk $29.95

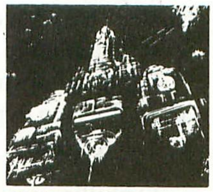


JUMPMAN

by Randy Glover from Epyx

New science fiction game! Jumpman must save all 30 levels of Jupiter Headquarters. Scale ladders, girders and perilous ropes while fighting off demonic destroyers. Joystick controlled, 5 game variations, 8 speed, music, sound effects and graphics. The ultimate test of reflexes for 1-4 players.

41713 32K Disk ~~$39.95~~
$31.96 20% Off Til July 10



SURVIVOR

by Richard Carr from Synapse Software

Fly your Starwedge Cruiser solo, with one or two gunners and/or a propulsion engineer, across a scrolling galaxy of danger and excitement. Only your skill can make you the Survivor. Requires joystick.

27739 16K Tape or 34872 16K Disk ~~$34.95~~ $27.96
33523 ROM Cartridge ~~$44.95~~ $35.96
20% Off Til July 10



CLIPPER

from Program Design, Inc.

Around the Horn in 1850! Choose the vessel, cargo, crew and course. Use your skill to overcome storms, icebergs, illness, delays, doldrums, mutiny and more. Voice-narrated, high adventure requires joystick.

32689 24K Tape $24.95
32690 32K Disk $29.95

MATHEMATIC-TAC-TOE

XO

by Nadav Caine from APX

Offbeat way for kids 8-16 years old to practice computational skills. It provides addition, subtraction, multiplication and division drills on 15 difficulty levels with time limit ranges from 2 to 23 seconds. Two players compete to fill a tic-tac-toe row with correct solutions.

21452 16K Tape or 21463 24K Disk $15.95



POKERSAM

by Jerry White from Don't Ask

This poker player can talk! POKERSAM narrates every hand, naming upturned cards, announcing bets and wise-cracking. He's a real character with a gift for gab!

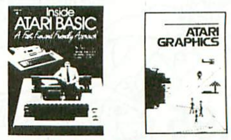
28336 Disk $24.95

FINANCIAL WIZARD

by Bill McLachlin from Computari

Superb personal finance program with 26 expense categories. Simple check entry and search by name, category, number or tax deduction. Features check balancer, printing and audit. Instructions on screen eliminates need for constant referral to manual.

15118 24K Disk $59.95



INSIDE ATARI BASIC

by Bill Carris from Reston

A fast, friendly approach by the training director of Atari Home Computers. This workbook is an introduction to key concepts of BASIC.

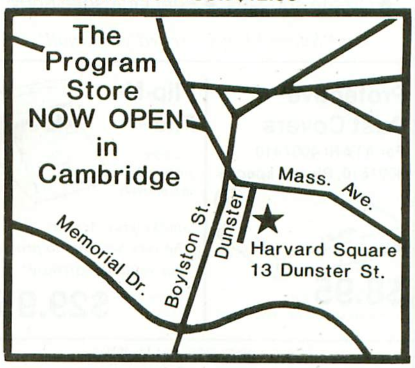
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NEC FIX

by JIM WOODING

Some NEC 8023A printers generate a high pitch tone or squeal when the power switch is on and "idling". It is caused by defective capacitors that were installed in many NEC 8023A's.

The cure is simple for anyone with any soldering experience. Here is what you will need:

1) phillips screwdriver
2) needle-nose pliers
3) soldering gun and solder
4) 200 pf ceramic capacitor (I used a Sprague Q-Line stock no. QCP-5135-01 rated at 1000 WVDC +/−20% tolerance.)

Follow these steps carefully:

1. Remove cover (covering ribbon cartridge and dip switches).
2. Remove two (2) screws (see Figure A).
3. Turn printer over, bottom-side up, platen knob facing you.
4. Remove snap-out bottom panel (covering large printed circuit board).
5. Remove only the screws (total 4) located at the corners of the printed circuit board. **CAUTION: DO NOT REMOVE THE REMAINING THREE SCREWS!**
6. Pull out the end of the printed circuit board nearest you (and farthest from the stepping motor) enough to identify capacitor "C2" (about 1 inch). (see Figure B) This capacitor is marked on the board so you should find it easily. Holding printer bottom-up and the stepping motor away from you, C2 will be at the extreme right of the printed circuit board, directly behind similar capacitor. Heat up the leads with your solder-gun, remove the defective capacitor, install the newly-purchased capacitor and re-solder the connections. Assemble in reverse order, plug in, and enjoy the peace and quiet of your NEW NEC!

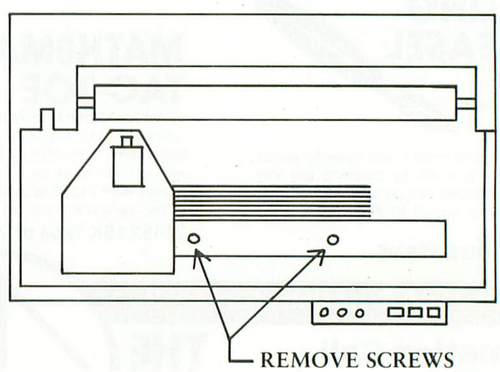


FIGURE A

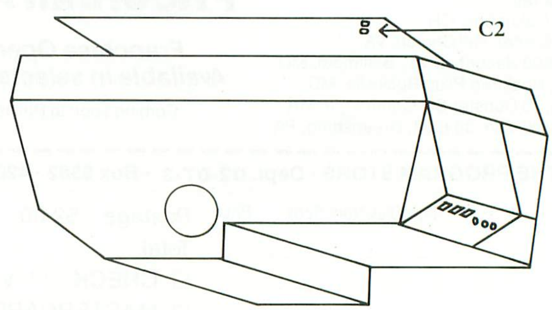


FIGURE B

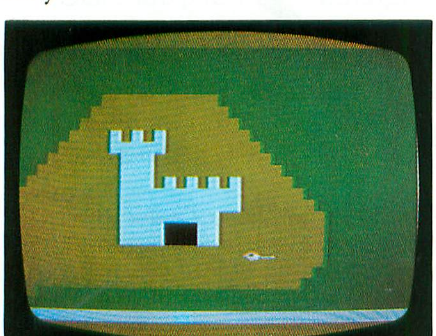
ANTIC PIX ADVENTURE

by DEBORAH BURNS

■ GALAHAD AND ■ ■ THE HOLY GRAIL ■

Atari Program Exchange

Here is a graphic adventure game for children ages 12 and up. While no text is used in this game (a feature good for computer jockeys with limited literacy), a joystick controls intricate movement through 100 action galleries. You are Galahad, a knight from the Arthurian Legends, and face many dangers during the dangerous quest for the Holy Grail. Fire breathing dragons and giant spiders challenge your skills and block your path. Entering the White Chapel, you begin your quest, choosing alternative routes through various portals with a quick move of the wrist and joystick. As you go deeper into the galleries, you may pick up tools and weapons which might prove of service in the quest: swords, magic rings, and keys to protect and aid you.





■ TEMPLE ■ ■ OF APSHAI ■

Epyx

In the mighty Temple of Apshai, the first adventure game in the DUNJONQUEST series of Epyx, you encounter a labyrinth full of treasures, traps and monsters. A best seller that is still high on the software charts, this is a fantasy role-playing game in which you choose the personal characteristics of your player-hero. You must generate your own player by answering questions from the Innkeeper, and enter and exit the dungeon with the guidance of the Dunjonmaster. The legend says that the temple was dedicated to a wise insect god and has been buried for generations beneath a village. You are the explorer of the secret caverns and must use quick wits to find the pharoah's treasure and to avoid the mandibles of a giant mantis.

■ ULTIMA II ■

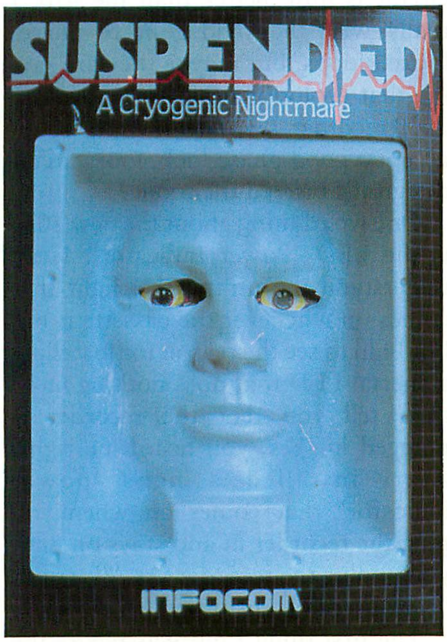
Sierra On-Line

Subtitled "Revenge of the Enchantress," this adventure game is probably the most challenging of its kind from Sierra On-Line. The sequel to the extremely popular original game Ultima, it is expanded beyond one world to an entire solar system over a longer period of time. The graphics are much improved, colorfully depicting dungeons, towers, enemies and advanced weaponry. The object, of course, is for the female sorceress to defend herself against her foes and counterattack their aggressions. Twisted mazes, various tricks and puzzles and subtle deceptions plague her survival and advancement. As one of the best and most difficult adventure games available, it will please the player who enjoys real thought and experimentation.



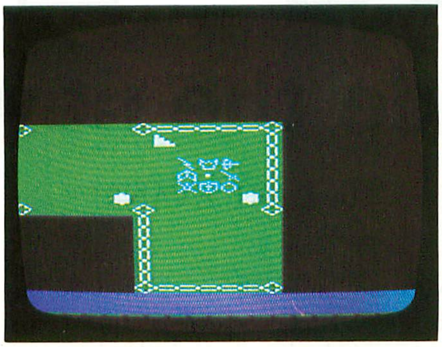
■ SUSPENDED ■
Infocom

This is a highly-complex and sophisticated game from a leading adventure game designer. The player is a cryogenically suspended and much-tortured soul who, while confined in this nightmarish frozen state, must yet maintain operating balance in the survival systems which control life on the home planet. Otherwise all is lost. Player perceptions and actions are achieved by commanding one or more of six robots which make careful adjustments to the life control systems of the planet. Also at the player's command is a Filtering Computer. Survival in this game depends upon proper relay of commands and proper management of the Library Core, the Weather System, Food Production, and Transportation on the planet's surface.



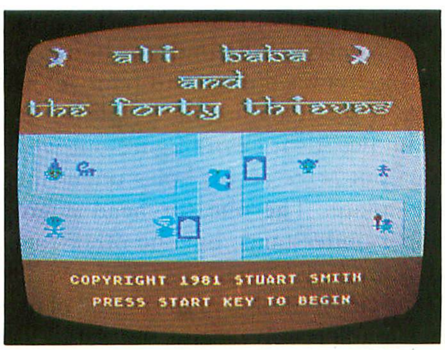
■ CREEPERS ■
Silicon Valley Systems

In this "seek-and-find" adventure game, eight fictitious characters search the ancient Temple of Kavinu to recover the Golden Chalice, an ancient symbol of the Kingdom of Corpas. Your task is to roam the temple, a maze-like structure located in the Forest of Doom on the Island of Gant, to find the chalice. Like other adventures, you choose the abilities and characteristics of the players that enable them to survive and conquer their obstacles. The Creepers are the deadly creatures that attempt to hinder your progress within the temple. Various options that change the maze's form allow you to move within different rooms, along different paths, to reach the goal.



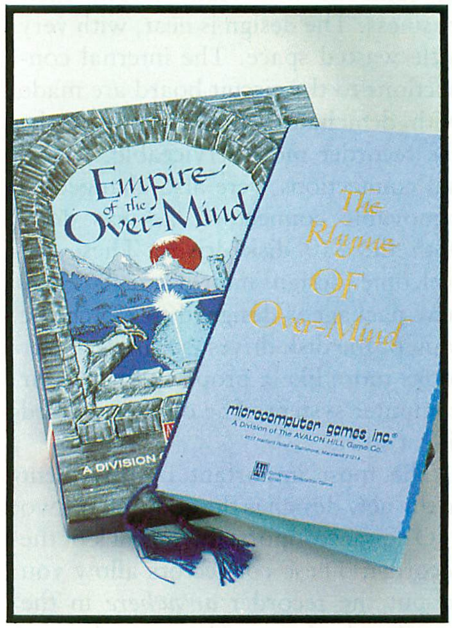
■ ALI BABA ■ ■ AND THE ■ ■ FORTY THIEVES ■
Quality Software

Alas! The lovely Princess Buddir al-Buddour has been kidnapped by a band of cunning cutthroats and merciless thieves, known as the Cogia Houssain, who have for years been stealing the wealth of the land. Now they have boldly stolen the sweet Princess, hiding her away in a secret cave deep in the mountains. You are Ali Baba, the heroic rescuer. In a strange dream, you pursue an obstacle-ridden and dangerous path to the cave, and after many exhausting trials, rescue the gentle maiden. This adventure game uses both keyboard commands and the joystick to vary the action. Dreaded creatures may block your path, and weapons may be used in combat.



■ EMPIRE OF THE ■ ■ OVER-MIND ■
Avalon Hill Game Co.

In this object-oriented adventure game, you must find your way in a strange world ruled by the mysterious Over-Mind. A powerful and crafty being, the Over-Mind controls an army of evil creatures lurking in dark corners to prevent adventurers from discovering its hiding place and destroying it. The odious mind-whip and other ingenious traps may halt your progress temporarily, but friends will turn up in the most unexpected places. The key to the action in this game is to match a verb (action) to a noun (object) that appears on the screen. A lyrical poem called "The Rhyme of Over-Mind" (that the manufacturer suggests you read before beginning play) tells the legend of this mighty and terrible creature and its empire.





TEN TEN

A look inside the new recorder

by CARL EVANS

I have just finished analyzing the new Atari 1010 cassette recorder. The new recorder turned out to be better than I expected, but not as good as I hoped.

The new package design was done by someone who really knows their business. The design is neat, with very little wasted space. The internal connections to the circuit board are made with detachable connectors to make the recorder more serviceable. External connections were also changed to removable connectors, as was done with the 810 disk drives. These are welcome design improvements. The new package is designed to match the look of the disk drives, so the recorder looks more like a proper part of your computer system. The old 410 looked like a stray.

The most important improvement in the new design is the addition of two I/O connector ports on the back of the recorder. These connectors allow you to put the recorder *anywhere* in the peripheral chain. The recorder no longer has to be the last item in the daisy-chain. This simple change in the design will improve the performance of cassette loads for those people who also have disk drives. Why? Because every connector in the daisy-chain introduces a little more noise into the system; and a bad connection will introduce a LOT of noise into the system. This design change was a good engineering move.

Another new aspect of the 1010 is that it has its own itty-bitty power pack similar to the ones used by the disk drives, but much smaller. This power pack plugs into the back end of the 1010 with the same kind of connector everything else in the system uses. This was another good move. The power transformer in the 410 recorder is permanently mounted inside the main recorder housing. The new detachable design makes maintenance easier. Although I don't believe that magnetic interference from the transformer was large enough to be any problem in the 410, you eliminate the possibility altogether by removing the transformer from the main housing.

I do have a few complaints about the new design. The access hole for doing head alignment, like that in the 410, is hidden under the label plate just above the buttons. This was a mere annoyance with the 410, but Atari decided to use a *much* stronger glue this time, so you almost need a crow bar to remove the plate. I couldn't remove it without damaging it. I guess this was done to convince you to get your heads aligned at a service center.

Next month's column describes how to do your own alignment at home. If anyone figures out how to remove the plate without damaging it, please let me know. Also, I can't figure out why Atari put *three* access holes under the label plate. The one for head alignment I understand, but the other two are a mystery to me.

The circuit design of the digital playback circuit is basically the same as that in the 410 recorder. This is a shame. The only real improvement in the circuit is that Atari went to five-percent resistors in the filter amplifiers. The actual performance of the circuit is little better than the 410. I really wish they had gone to phase-locked loops, but maybe they are saving that evolutionary step for a future 2010 recorder. I wonder if Atari would accept a good phase-lock, loop-circuit design if I offered them one?

One weird thing about the new 1010 is the LED "Power Indicator". I can understand the utility of a light that comes on whenever the cassette is on; but I fail to see the reason for installing a special LED that does nothing more than tell you that the recorder is plugged in. Yes, you heard me right. Atari installed a new "power indicator" that comes on when you plug the recorder in and stays on until you unplug the recorder. As Alice said, "curiouser and curiouser"!

The first thing I did was rewire the LED. To do this, disconnect the "gold-band" end R141 from the circuit board and connect it to the "gold-band" of end of R140 by soldering a small wire (see the board in your 1010 recorder and look right next to the LED connector). Make sure this new connection does not accidentally reconnect to the circuit board. This small modification changes the function of the LED so it will only come on when the PLAY, RECORD, FAST FORWARD, or REWIND buttons are pressed. I would

have preferred to change it so the LED would light up only when the cassette motor was on in PLAY or RECORD, but that would have required cutting some traces and installing some additional circuitry. It wasn't worth the effort.

All in all, I don't think the new 1010 is significantly better than the 410. Over the last four weeks, it has performed about the same as my unmodified 410 recorder. If you have a 410, don't rush out and buy the new 1010. You will be better off installing the hi-rel modification I discussed earlier (April, '83). If you don't have an Atari recorder yet and really need to get a new one, then you might as well get the 1010 recorder. The bottom line is that the new 1010 is a slight improvement over the 410, but Atari still has a long way to go before they will have what I would call a *good* recorder.

One final word before I bop off this month. I have received a number of letters from you complaining that your local *Radio Shack* stores don't carry one percent resistors. You are right. Radio Shack does *not* carry one percent resistors. The fault is mine.

First, I should explain what I meant by "one percent" vs. "ten percent" resistors. The answer is not what you might think. The easiest way to explain is by using an example. Let's take the case of a typical 240K-ohm resistor. When these resistors are first tested, the manufacturer sets the measuring equipment at 240K ohms plus or minus one percent. Therefore, any resistors whose resistance is between 237.6K and 242.4K pass this test and are labeled "one percent" resistors. The resistors that flunked this test are then tested with the equipment set at 240K plus or minus two, five, ten and maybe even twenty percent depending upon how many fail at each level. So, a "ten percent" resistor is really a resistor with a resistance somewhere between (for our 240K-ohm case) 216K and 264K. Whatever the resistor's exact resistance, it is still called a 240K resistor. Any given resistor may not vary more than a fraction of a percent around its actual value, but it is still rated based upon the screening test relative to the nominal value of 240K!

Okay, now I can tell you how to get a "one percent" resistor from Radio Shack. All you have to do is buy one of their bulk resistor packs, all of which are supposedly 240K resistors, and use an ohmmeter to find one that really is 240K (plus or minus 2.4K). Cheap resistors like those usually don't go through the extensive screening tests that I just told you about, so the values will vary all over the place. I hope that his helps to clear up some of the confusion.

The only real difference between what a vendor calls a "one percent" and a "ten percent" resistor is price. If you want to get a *real* one percent resistor for the hi-rel mod, then call up any good electronics supply house and ask for these two part numbers: RN-55-D-2433-F and RN-55-D-3323-F. These are the standard industry part numbers for 1/10-watt precision metal film resistors. You will be safe enough with 1/10 watt since the power dissipation in that part of the playback circuit is less than a 1/1000 watt.

By the way, I was able to find the needed resistors at a local electronics supply store (38 cents each, minimum purchase 25) with two phone calls spaced over about ten minutes. You might not be able to locate them quite as fast as I did, but I trust you won't find your quest as impossible as some of your letters would try to make me believe.

LIST ASSISTER

by DANA NOONAN

One of the nicest features of the ATARI computer is the ease of using inverse and control characters within programs, but reading a printout of a program containing these characters is a frustrating experience. Inverse characters become weird graphics and other non-normal characters become difficult to decipher. This Program Lister will enable you to produce a readable printout of any LISTed program.

When RUN, the program asks for the name of the program you want to have listed to the printer. It must be a LISTed and not SAVEd program. Be sure to type D: or D2: before the file name. You will then be asked the date and source of the listing. You may leave these blank if you wish. Next you will be asked if you want condensed print. If you type "N" the normal printer font and type size will be used. Variable T sets the type size for the Epson printer (Lines 700, 710). If you have a different printer change the values of this variable to match your machine. After you have chosen the print size, the screen will go blank until the printer is done (Line 630). Any errors will bring the screen back to life and print a suitable message (Lines 730–820).

Inverse character strings will be printed between | |, controls between [ ], inverse controls between < >. Other unprintable characters will be described in plain English between brackets. At the top of the first page the file name, source, date, and page number of the listing will appear. The next printed line will print the main listing conventions.

The main portion of the program begins with Line 70 (control later shifts to line 130). Each line is checked for quotes and inverse characters. If either is found, QF (the quote flag) is set to 1 (Lines 160–170). The printer will skip a line before each program line that begins with a "REM" statement (Line 200). I have written the program so that it tabs over from the left margin and prints right-justified line numbers followed by two blank spaces (Lines 190, 220). You may omit either of these features if you wish.

At this point the program will print the remainder of a line if the quote flag has not been reset and the length of the line (LL) does not exceed the length determined when the character set was chosen (Line 230). If either of these conditions exists, the program will check the line for length and non-normal characters (Lines 240–410). If the length limit is about to be reached, the program will look for appropriate points to begin at the next line. Additional lines are indented to make the printout easier to read.

Beginning with line 300 the program checks the ASCII value of each element in substring A$(N) and branches to the appropriate line to print the character. After each non-normal character is printed, LN is adjusted to reflect the extra characters printed. This keeps the line from spilling over to the next line before its normal length (LL) is reached.

The treatment of the inverse normal characters differs a little from that of the other non-normal characters. Since so many programs contain inverse strings of more than one character, this program checks to see if additional inverse characters follow (Line 480–540). The TRAP statement in line 510 is needed to end inverse REM statements and begin a new line.

Lines 550 to 610 advance the printer, control page length and print a header on each page. Lines 730 to 820 come into play only if an error occurs. The program traps these following errors: the end of the file (error 136), non-existent file (error 170), and printer not online (error 138). Any other error causes the program to begin again.

The speed at which the program produces a listing depends on the length of program lines and number of quotes or REMs. It took a little more than two minutes to list the program itself. The program could be speeded up some by omitting lines 190–230, but the improved format of the printout would be lost. All REMs can be safely omitted.

```
10 REM * PROGRAM LISTER *
20 REM * BY DANA NOONAN *
30 REM * COPYRIGHT 1982 *
40 REM SET-UP PROGRAM
50 DIM A$(500),F$(15),B$(20),R$(4),L$(
12),Y$(1),D$(20),S$(30)
60 B$="                    ":R$="REM "
70 OPEN #2,4,0,"K:":GOSUB 650
80 CLOSE #2:PK=PEEK(559):POKE 559,0
90 TRAP 720:OPEN #1,4,0,F$:OPEN #4,8,0
,"P:":INPUT #1;A$
100 ? #4;CHR$(T);B$;F$;B$(7);"Page ";P
G;B$(7);S$;B$(7);D$:? #4:? #4
110 ? #4;B$;"| | = Inverse";B$(7);"[ ]
 = Control";B$(7);"< > = Control Inver
se":? #4:L=5:PG=PG+1:GOTO 140
120 REM GET DATA
130 TRAP 720:INPUT #1,A$
140 C=LEN(A$):RF=0:QF=0:S=0:LL=65*(T=1
```

continued on next page

```
8)+120*(T=15)
150 REM CHECK REMS, QUOTES, AND LINE N
UMBERS
160 FOR I=1 TO C:A=ASC(A$(I,I))
170 IF A=34 OR A>159 THEN QF=1:GOTO 19
0
180 NEXT I
190 FOR N=2 TO 6:IF ASC(A$(N))<>32 THE
N NEXT N
200 IF A$(N+1,N+4)<>R$ THEN RF=1
210 IF RF=0 THEN ? #4:L=L+1
220 S=6-N:? #4;B$(12-S);"⇤";A$(1,N);"
";:N=N+1
230 IF QF=0 AND C<LL THEN ? #4;A$(N):G
OTO 590
240 REM CHECK ASC VALUE
250 II=N:FOR I=N TO C:A=ASC(A$(I,I)):I
I=II+1
295 IF II>(LL+7) THEN ? #4;CHR$(155);B
$(5);:L=L+1:LL=LL+65*(T=18)+120*(T=15)
300 IF A>31 AND A<125 THEN 560
310 IF A>159 AND A<254 THEN 490
320 IF A>127 AND A<155 THEN 430
330 IF A<27 THEN 460
340 RESTORE
350 READ D,DL,L$
360 IF D<>A THEN GOTO 350
365 IF (II+DL)>(LL+7) THEN ? #4;CHR$(1
55);B$(5);:L=L+1:LL=LL+65*(T=18)+120*(
T=15)
370 ? #4;"[";L$;"]";:II=II+DL:NEXT I
380 DATA 27,8,ESCAPE,28,4,UP,29,6,DOWN
,30,6,LEFT,31,7,RIGHT
390 DATA 125,7,CLEAR,126,10,BACK SPACE
,127,5,TAB
400 DATA 156,13,DELETE LINE,157,13,INS
ERT LINE,158,11,CLEAR TAB,159,9,SET TA
B
410 DATA 253,6,BELL,254,8,DELETE,255,8
,INSERT
420 REM INVERSE CONTROL CHARACTERS
430 IF A=128 THEN ? #4;"<,>";:II=II+3:
NEXT I
440 A=A-64:? #4;"<";CHR$(A);">";:II=II
+2:NEXT I
450 REM CONTROL CHARACTERS
460 IF A=0 THEN ? #4;"[,]";:II=II+3:NE
XT I
470 A=A+64:? #4;"[";CHR$(A);"]";:II=II
+2:NEXT I
480 REM INVERSE NORMAL CHARACTERS
490 IF A=253 THEN ? #4;"<;>";:II=II+3
:NEXT I
500 A=A-128:? #4;"|";CHR$(A);:II=II+2
510 TRAP 540:I=I+1:II=II+1:A=ASC(A$(I,
I)):IF II>(LL+7) THEN ? #4;CHR$(155);B
$(5);:L=L+1:LL=LL+65*(T=18)+120*(T=15)
520 IF A>159 AND A<253 THEN A=A-128:?
#4;CHR$(A);:GOTO 510
530 ? #4;"|";:II=II+1:GOTO 295
540 TRAP 830:? #4;"|";:? #4:L=L+1:GOTO
 590
550 REM PRINT LINE AND GET NEXT ONE
560 IF A=96 THEN ? #4;"[.]";:II=II+2:N
EXT I
570 IF A=123 THEN ? #4;"[;]";:II=II+2:
NEXT I
580 ? #4;CHR$(A);:NEXT I:? #4
590 L=L+1:IF L<60 THEN GOTO 130
600 FOR NN=1 TO 6-(L-60):? #4:NEXT NN
610 ? #4;B$;F$;B$(7);"Page ";PG:? #4:?
 #4:PG=PG+1:L=3:GOTO 130
620 REM END
630 ? #4:POKE 559,PK:GRAPHICS 0:POSITI
ON 12,8:? "COPY COMPLETE":CLOSE #1:CLO
SE #4:CLR :END
640 REM TITLE
650 GRAPHICS 0:? :? "▶      PROGRAM LIS
TER"
660 ?:?:? "  ENTER FILE NAME:";:INPU
T F$
665 IF F$(2,2)<>":" OR F$(3,3)<>":" TH
EN D$(1,2)="D:":D$(3)=F$:F$=D$:D$(1)="
 ":D$(20)=" ":D$(2)=D$
670 ? :? "  DATE";:INPUT D$
680 ? :? "  SOURCE";:INPUT S$
690 ? :? "  CONDENSED PRINT (Y or N)";
:INPUT Y$:IF Y$<>"Y" AND Y$<>"N" THEN
 ? "↑↑↑↑":GOTO 690
700 IF Y$="Y" THEN T=15:LL=120:PG=1:RE
TURN
710 IF Y$="N" THEN T=18:LL=65:PG=1:RET
URN
720 REM ERROR TRAPPING
730 IF PEEK(195)=136 THEN 620
740 TRAP 830:CLOSE #1:CLOSE #4:POKE 55
9,PK:OPEN #2,4,0,"K:"
750 IF PEEK(195)=170 THEN 790
760 IF PEEK(195)=138 THEN 810
770 ? "◤":POSITION 7,10:? "CANNOT PRIN
T THIS LISTING"
780 POSITION 7,12:? "PRESS RETURN TO T
RY AGAIN":GET #2,Q:CLR :RUN
790 IF PEEK(195)=170 THEN ? "◤":POSITI
ON 10,10:? "NO FILE BY THAT NAME"
800 POSITION 7,12:? "PRESS RETURN TO T
RY AGAIN":GET #2,Q:CLR :RUN
810 ? "◤":POSITION 5,10:? "CHECK PRINT
ER AND PRESS RETURN":GET #2,Q:GOTO 80
820 ? #4;">";:LN=LN-1:GOTO 300
```

TYPO TABLE

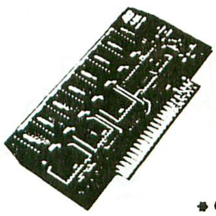
Variable checksum = 320496

Line num range		Code	Length
10 -	110	WY	633
120 -	230	IP	508
240 -	370	TW	491
380 -	480	MA	526
490 -	560	VL	525
570 -	665	MQ	594
670 -	780	SG	543
790 -	820	QG	271

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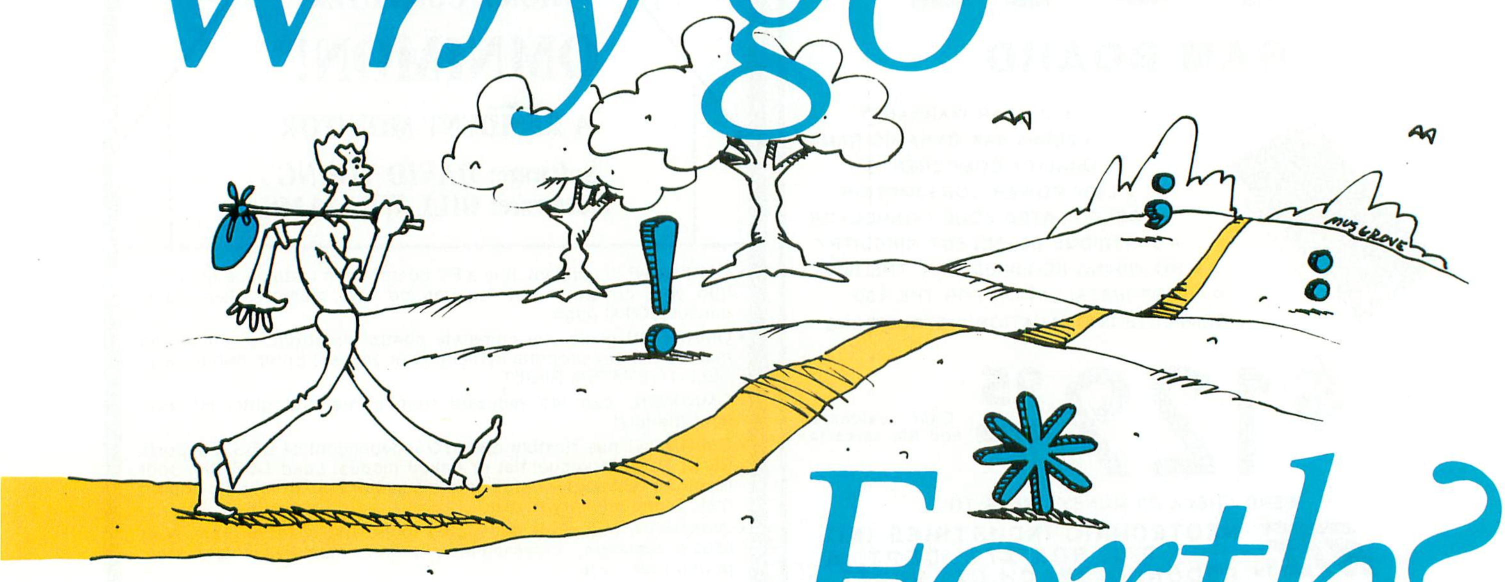
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Why go Forth?



by THOMAS McNAMEE

As an ATARI BASIC programmer, I began noticing Forth articles at about the same time as I noticed BASIC's limitations. One thing that grabbed my attention was the frequent comment, "It's real fast."

Well, fine. Assembly Language is fast but it's a lot of work writing anything useful in it. Macro assemblers helped a little by allowing me to create a library of useful subroutines, but they were up to me to create. What I really wanted was easy access to the graphics and sounds functions of the ATARI, at speeds fast enough to write an arcade game, without having to develop advanced programming skills. Little did I know, but I was describing Forth.

My interest in Forth led me to ask: "What's in it for me?", and "How hard is it to use?" To answer these questions I'll discuss what Forth can offer the BASIC programmer, and then show the development of an example Forth "word".

Forth is analogous to the human body. The body has systems comprised of organs, organs comprised of tissues, tissues comprised of cells. Similarly, Forth is a hierarchical structure.

This structure creates what is called extensibility. It's like having a number of subroutines in BASIC, custom designed to perform any operation you could imagine, and calling them in the order in which they are to be executed. Extensibility makes Forth a very flexible programming environment. New commands are called *words*, and as they are defined, they are compiled into memory in a group called the *dictionary*. This compiled form of Forth executes at about ten to twenty times the speed of BASIC, or about half the speed of machine language. If this isn't fast enough, Forth comes with an assembler which permits critical routines to be coded in machine language. The assembler itself is written in Forth, which may give you some idea of the power of this language. With the assembler, Forth can be a high-level and a low-level language at the same time.

Forth code is also very compact. Once defined, a word can be used in many places in the application program. A "bottom-up" approach to program development allows very efficient program design. Words can be used in many applications. Once you have defined a word, it can be used in any program with a suitable context.

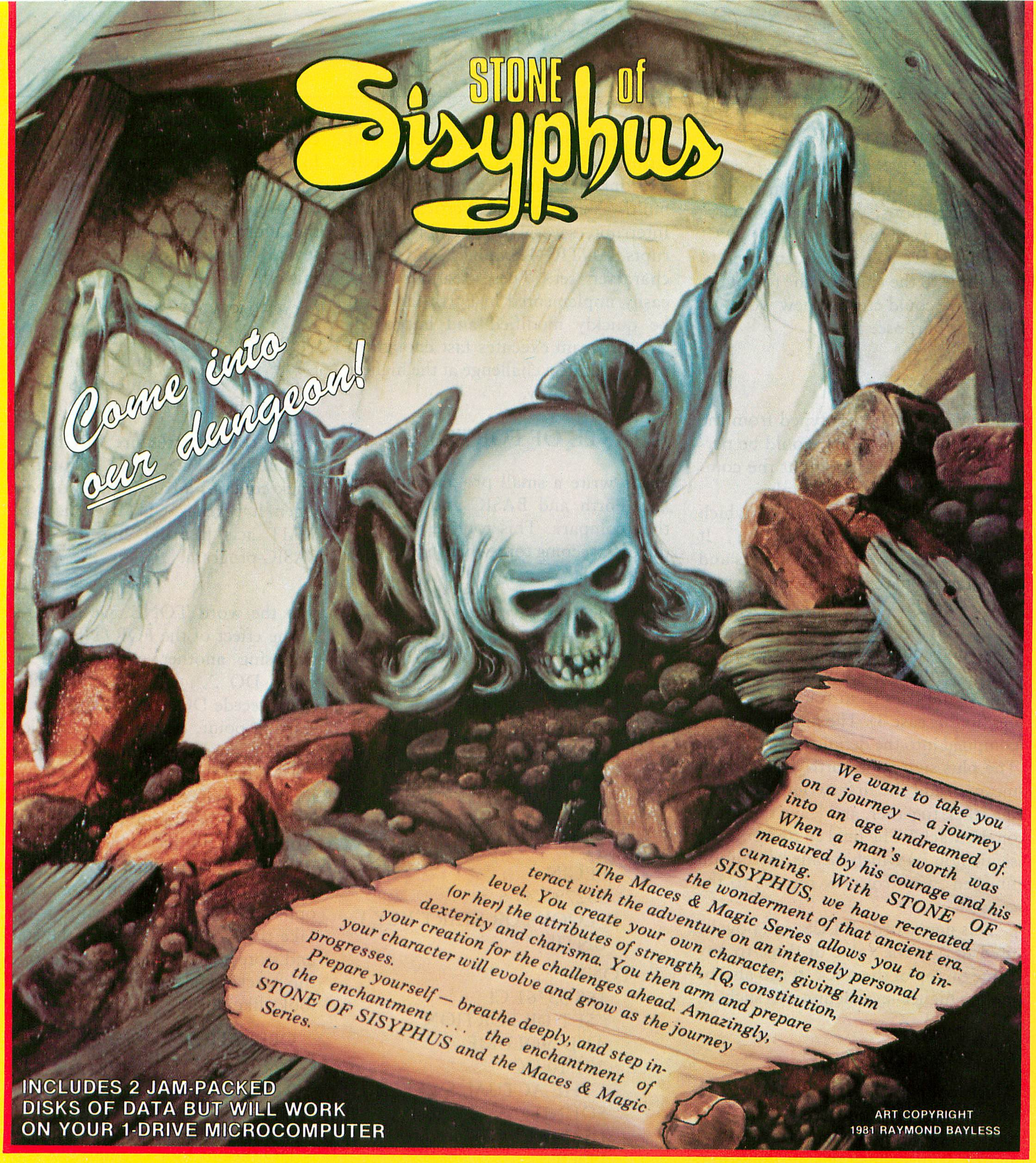
NUTS AND BOLTS

The mechanics of Forth require getting used to, but they are not too difficult. Forth is a stack-oriented language, and uses RPN (Reverse Polish Notation) logic. The stack is used as a last-in, first-out storage area. To add four and three, you would type:

```
4 3 +
```

When you type 4 it goes on the stack. When you type 3 it goes on top of 4, pushing 4 down. When you type +, that's the signal to add the 4 and 3, replacing these with the value 7.

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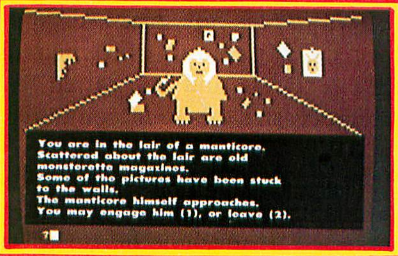


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WHY GO FORTH?

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The stack holds results of arithmetical calculations, and passes parameters between words.

Suppose we have a frequent need to add three to the value on the top of the stack. We could create a new word for just that purpose:

```
: 3PLUS
    3 + ;
```

Whenever 3PLUS was typed from the console, that operation would be performed. Let's take a look at the components of the above example.

The colon (:) is a Forth word which basically means "start defining". It takes the next group of characters and prepares to make a dictionary entry called 3PLUS.

The compilation process then takes the next group of characters (the 3) and tries to turn it into a number (in this case 3). The number is now compiled into the definition of 3PLUS. The plus sign, is a Forth word which means, "add the first two numbers on the stack together, and leave the result on the stack". The final character is the semicolon (;) which means "definition finished". Control now returns to the console.

This new word, 3PLUS, can now be used to add the value of three to any value on top of the stack. It can also be used in higher-level definitions such as:

```
: 2+3+
    2 + 3PLUS ;
```

This would first add two, then three to the number on the top of the stack. If you don't understand this, don't worry. It just illustrates an important point: there is no limit to the number of ways you can structure your dictionary. Your library of commands can be as large and as varied as the memory size of your computer will allow.

Features of the ATARI not readily available from BASIC can be easily accessed at machine language speeds with Forth. This includes Player/Missile graphics, versatile sound control, redefined character sets, and custom display lists. I am currently working on an arcade game which uses multi-tasking in the Vertical Blank Interrupt, several Display List Interrupts, ANTIC 4 graphics, and a new character set. These features were easily implemented in Forth, and can be quickly modified and improved. The program executes fast enough to provide quite a challenge at the highest level of difficulty.

A TASTE OF FORTH

Let's write a small program in both Forth and BASIC and see how they compare. This routine will produce a sweeping tone when [START] is pressed.

In BASIC:

```
10 IF PEEK(53279) <> 6
   THEN GOTO 10
20 POKE 53761,168:REM
   Distortion = 10, Volume = 8
30 FOR FREQ = 10 TO 200
40 POKE 53760,FREQ
50 NEXT FREQ
```

In Forth:

```
: WAIT
    BEGIN
    53279 C@ 6 =
    ( LOOK FOR START KEY )
    UNTIL;
: TONE
    168 53761 C!
    ( SET DISTORTION
    AND VOLUME )
    201 10 DO
    ( THE ACTUAL SWEEPING
    SOUND )
    I 53760 C!
    LOOP ;
: SWEEP
  ( PUT IT ALL TOGETHER )
    WAIT
    TONE;
```

To understand the Forth word SWEEP, several terms should be defined. Remember, every term in WAIT, TONE and SWEEP is either a FORTH word or a number. The words contained in parentheses are comments only; they do not execute. In WAIT, C@ fetches the eight-bit value contained in the address on the top of the stack. After C@ is executed, the address is replaced with its contents. So, the definition of WAIT has this effect:

OPERATION	STACK
53279	53279
C@	contents of 53279
6	contents, 6
= (compare)	1 if equal, 0 if not

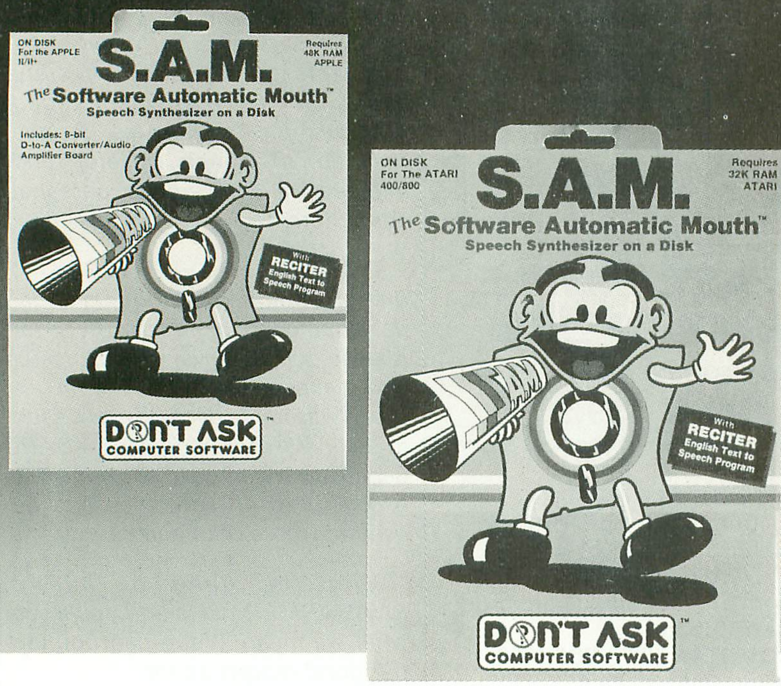
The control structure BEGIN . . . UNTIL loops back to BEGIN until the stack contains a true (non-zero) value when it reaches UNTIL. The word WAIT acts just like line 10 of the BASIC program.

In the word TONE, we reproduce the effect of the FOR/NEXT loop by using another control structure called DO . . . LOOP. The numbers that precede DO are the limit and the starting point, respectively. Our loop will execute by counting from ten to 200. When the index reaches 201, the loop terminates. Inside the loop, the index may be found with the Forth word I which leaves the current index on the stack. The final term to be explained is C!. It is the store operation opposite C@, and its function is this: take the second number on the stack and store it at the address at the top of the stack. The operation of TONE looks like this:

OPERATION	STACK
168	168
53761	168, 53761
C!	empty
201 10	201, 10
DO (begins loop)	empty
I (fetch index)	10 to 200
53761	10 to 200, 53761
C!	empty
LOOP (go back to DO if I < 201)	

Finally, the words WAIT and TONE are combined to form SWEEP. One principle of Forth pro-

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gramming is that it is better to create many small, useful words than several large ones. WAIT could be used anywhere that requires the program to wait until [START] is pressed. We have another job for TONE below.

Both the BASIC and the Forth programs produce a rising tone. To hear the Forth tone well, however, a delay would have to be inserted in the DO . . . LOOP structure.

Say your game project needs a succession of five of these sweeps to signal "red alert." In Forth, this could be accomplished using the DO . . . LOOP:

```
: REDALERT
    5 0 DO
    TONE
    LOOP;
```

Will BASIC give you this kind of flexibility?

HOW TO START GOING FORTH

The best way to judge Forth is to read the best book on the subject: *Starting FORTH*, by Leo Brodie. It describes the language from the ground up, and will serve as a valuable reference after you start FORTH. This book is available from the FORTH Interest Group, PO Box 1105, San Carlos, CA 94070. FIG is an excellent resource for beginning and advanced programmers alike. They will send you a catalog upon request.

ValFORTH (available from Valpar International, 3801 East 34th Street, Tucson, AZ 85713) is a very versatile Forth package which can be purchased in modules.

There is a certain fanaticism in the Forth community about this powerful young language. It seems that once you start using Forth, you never turn back. This article touches only the surface of this language; there is much more ground to cover.

Forth is a language which is immediately useful, but it will never be fully explored. It allows every ATARI programmer to get the most out of his machine.

Hokey Pokey Interrupts

by ED STEWART

Despite the great wealth of information available about the ATARI computers, I have been unable to get adequate information concerning the operation of the POKEY timers. The Hardware manual makes reference to these timers but there is no discussion of their function. **De Re Atari** has an excellent discussion of the POKEY chip, but nary a mention of how the interrupts operate. I couldn't believe that Atari would develop an interrupt mechanism for the POKEY timers without a reason, yet very little was ever said about it. I've investigated this area on my own and here are the results. POKEY generates sound in an interesting manner. A short pulse of electricity is sent to the TV speaker. This pulse causes the speaker cone to rapidly change its position with a resulting "pop" sound. This process is repeated many times per second. The sound produced can range from a musical tone to a synthesized human voice. The distance the cone travels corresponds to the volume of the sound since it requires more force to move the cone a longer distance. The frequency of the pulses sent to the speaker controls the pitch of the tone. Four semi-independent pulse generators, or voices, exist in the POKEY chip. These voices can generate pulses to the speaker simultaneously. The resulting frequency is the sum of the individual frequencies of the four voices and can range from about one pulse every four seconds to thousands of pulses per second. At very low frequencies individual "pops" are audible as you can hear using the program I have provided, while the higher frequencies are well beyond our range of hearing. It is possible to generate an interrupt each time a pulse is sent from voice numbers one, two, or four. The number of interrupts generated can therefore range from one every four seconds to thousands per second.

An interrupt is a pre-emption of the program which is currently executing in the computer. This interruption is completely transparent to the interrupted program. Interrupts happen frequently in most computer systems and are used to notify the CPU of the occurrence of some external event such as the completion of an I/O operation. In the ATARI computer, interrupts occur a minimum of 60 times per second during the vertical blank process, also known as VBI. POKEY timer interrupts can be used to keep track of events that occur more frequently than 60 times per second or as seldom as once every four seconds. If interrupts occur too often, there will be little time available for anything else but servicing of the interrupts.

Atari has not employed this POKEY interrupt scheme in any programs even though the Operating System supports it (except for POKEY timer number four, due to a bug in Operating System Revision A). The reasons for this lack of popularity are as follows:

1. Vertical Blank Interrupts (VBI's) are more regular, occuring 63.9210 times per second. They are therefore more appropriately used for clock and timer functions found in the computer.
2. POKEY interrupts are of the IRQ variety. This means its interrupts can be temporarily delayed if the computer has disabled IRQ interrupts as it does during VBI processing. This delay, along with the asynchronous fetching of video-screen data from RAM, causes the frequency of this timer interrupt to be somewhat irregular, especially at frequencies above 200 interrupts per second. Changing of graphics modes will also affect the frequency interference of POKEY interrupts.
3. If a timer (1, 2, or 4) is being used for this purpose, its use as a sound generating mechanism has been compromised. This is also true of I/O processing because POKEY uses the voices to clock data coming into and going out of the computer on the serial bus.

Nevertheless I feel that this POKEY timer has some potentially useful applications. For high-throughput applications such as real-time data monitoring, VBI's can be disabled along with the screen DMA process. You can then use this automatic interrupt mechanism to infrequently gain control of the computer rather than approximately 60 times per second. If you need to repeat a process more than 60 times per second you cannot do it using the current BVI

continued on next page

mechanism—you must use the POKEY interrupt scheme.

I used the accompanying program to discover the secrets of this interrupt mechanism. You can also use this program to determine what frequency values to use in obtaining a specific interrupt rate per second. In order to increase accuracy I used the 16-bit mode of sound generation rather than the more commonly used 8-bit mode. Voices one and two were used together as the source listing shows. When you execute this program it will display the values of the system variable AUDCTL and AUDF. IFREQ will be displayed on your screen as the interrupt frequency-per-second encountered for a specific AUDCTL and AUDF value. Audio feedback will also be generated as you actually hear the interrupts occur.

A summary of the process of setting the interrupt environment is as follows:

1. set the correct interrupt exit vector starting at address $210,
2. enable the particular timer by setting the correct IRQ mask in POKMSK and the associated hardware register at $D20E,
3. set AUDCTL and AUDF to the desired values which will determine the interrupt frequency,
4. start the timer by storing any value at location $D209.

In the interrupt routine note that you must restart the timer at $D209 to get additional interrupts to occur. This program counts the number of interrupts that occur in two seconds to determine the value IFREQ. When you run this program you will notice that the normal "divide by two" circuitry that occurs for the determination of the final output voice frequency does not apply to the interrupt frequency. Instead, the interrupt frequency is equal to twice the output voice frequency.

Many people confuse the POKEY timer interrupts with the software timers which occur during the VBI process. I hope that I have helped illuminate one of the lesser known secrets of your ATARI computer. I do know that I have enjoyed discovering how it functions and sharing that information with you.

```
20 ;ATARI EQUATES
30 CIOV  =  $E456   CIO ENTRY POINT
40 FASC  =  $D8E6   FP-->ASC CONV RTN
50 IFP   =  $D9AA   INT-->FP CONV RTN
60 FMOVE =  $DDB6   FP MOVE RTN
70 FLDOR =  $DD89   FP RTN
80 FDIV  =  $DB28   FP DIVIDE RTN
90 FMUL  =  $DADB   FP MULT RTN
0100 ;IOCB COMMANDS
0110 OPEN =  3
0120 PUTREC = 9
0130 PUTCHR = $0B
0140 CLOSE = $0C
0150 POKMSK = $10
0160 ;DEVICE NAMES
0170 PRINTR = 'P
0180 CR  =  $9B     CARRIAGE RETURN
0190 CLS =  $7D     CLEAR SCREEN
0200 ;RAM ASSIGNMENTS
0210 RTCLOCK = $12   3 BYTE CLOCK
0220 FR0 =  $D4     FP REG ZERO
0230 INBUFF = $F3   INBUFFER FOR FP
0240 INTABS = $0200  RAM INTERUPT VECT
S
0250 VTIMR2 = $0212  POKEY TMR INT VEC
T
0260 ATACHR = $02FB  ASCII KEY
0270 CH   =  $02FC   KEY
0280 IOCB = $0340   IOCBS
0290 ICHID = $0340  HANDLER INDEX NO.
0300 ICDNO = $0341  DEVICE NUM
0310 ICCOM = $0342  COMMAND CODE
0320 ICSTA = $0343  STATUS
0330 ICBAL = $0344  BUFFER LOW ADR
0340 ICBAH = $0345  HI ADR
0350 ICPTL = $0346  PUT BYTE RTN-1
0360 ICPTH = $0347  "
0370 ICBLL = $0348  BUFFER LEN LOW
0380 ICBLH = $0349  BUFFER LEN HI
0390 ICAX1 = $034A  AUX INFO 1
0400 LBUFF = $0580  FP BUFFER
0410 ; OTHER EQUATES
0420 LOW  =  $FF    USE TO GET LOW AD
DR
0430 HIGH =  $0100  USE TO GET HIGH A
DDR
0440     *=  $02E0
0450 EP  .WORD LOAD
0460 ;START THE PROGRAM
0470 LOAD =  $6000
0480     *=  LOAD
0810     LDA #0      INITIAL SETTING
0820     STA $D202   FOR AUDF2
0830 M10 JSR CNT     GO COUNT INTERRUP
TS
0840     JSR CONV    CONVERT RESULTS
0850     INC AUDF1   GET NEXT HIER NUM
BER
0860     INC AUDF1   ADD ONE TO IT
0870     BNE M10     CONT WITH THIS CT
L
0880     INC AUDF2   ADD ONE TO HI BYT
E
0890     INC AUDF2   ADD ONE TO HI BYT
E
0900     BEQ M15     DONE WITH ALL OF
THEM
0910     LDA AUDF2   GET NEW VALUE
0920     STA $D202   STORE NEW FREQENC
Y
0930     JMP M10     AND CONTINUE
0940 M15
0950 ;GOTO 16K CLOCK TIMING
0960     LDA #'1
0970     STA AUDCTM+1 SAVE MSG
0980     LDA #$11    AUDCTL SETTING
```

continued on next page

```
0990     STA AUDCTLS SAVE IN MEMORY
1000     LDY #0
1010 M20 LDA FIN16K,Y GET BYTE
1020     STA FIN,Y   SAVE IT
1030     INY
1040     CPY #6      ?ALL BYTES YET
1050     BNE M20     NO
1060     LDA AUDFI   START COUNT
1070     STA AUDF1   SAVE VALUE
1080     LDA #0      INITIAL
1090     STA $D202   VALUE FOR AUDF2
1100 M30 JSR CNT     GO COUNT INTERRUP
TS
1110     JSR CONV    CONVERT RESULTS
1120     INC AUDF1   GET NEXT HIER NUM
BER
1130     INC AUDF1   ADD ONE TO IT
1140     BNE M30     CONTINUE ALL SETT
INGS
1150     INC AUDF2   ADD ONE TO HI BYT
E
1160     INC AUDF2   ADD ONE TO HI BYT
E
1170     BEQ M35     DONE WITH ALL OF
THEM
1180     LDA AUDF2   GET NEW VALUE
1190     STA $D202   STORE NEW FREQENC
Y
1200     JMP M30     AND CONTINUE
1210 M35
1220 EOJ JMP EOJ     FINISHED
1230 ;SUBROUTINE TO OUTPUT MSG
1240 ; ENTRY: A=LEN, X=HI, Y=LO
1250 ; EXIT: NO INFO
1260 MSGOUT STX MGOUT1+2 SAVE HIGH
1270     STY MGOUT1+1 SAVE LOW
1280     STA MGOUT2+1 SAVE LENGTH
1290     LDX #0
1300 MSA1 STX SAVCNT
1310 MGOUT1 LDA $1000,X GET CHAR
1320     PHA         SAVE A
1330     LDX #$00    IOCB #0
1340     LDA #PUTCHR
1350     STA ICCOM,X SAY PUT CHR
1352     LDA #0
1354     STA ICBLL,X
1356     STA ICBLH,X
1360     PLA         RESTORE A
1370     JSR CIOV    GO PUT TO SCREEN
1460 MGO2 LDX SAVCNT
1470     INX
1480 MGOUT2 CPX #0   COMPARE LENGTH
1490     BNE MSA1
1500     RTS
1520 SAVCNT .BYTE 0
1550 AUDF2 .BYTE $00
1552 AUDFI .BYTE $30 INIT AUDF1 SET
1560 AUDF1 .BYTE $30 AUDF1 SETTING
1570 AUDCTLS .BYTE $10 AUDCTL SETTING
1580 ;FIN = 63.9210 KHZ
1590 FIN64K .BYTE $43,$63,$92,$10,0,0
1600 ;FIN = 15.6999 KHZ
1610 FIN16K .BYTE $43,$15,$69,$69,0,0
1620 ;64K TO START
1630 FIN .BYTE $43,$63,$92,$10,0,0
1640 AUDMSG .BYTE "AUDCTL="
1650 AUDCTM .BYTE "10"," "
1660     .BYTE "AUDF="
1670 AUDFM .BYTE 0,0,0,0," "
1680 IFREQ .BYTE "IFREQ="
1690 IFREQM .BYTE "          ",CR,CR
1720 MSGE = *-AUDMSG LENGTH OF MSG
1730 ;INTERRUPT TIMER SUBROUTINE
1740 CNT LDA #EXIT&LOW SAVE
1750     STA VTIMR2  VECTOR
1760     LDA #EXIT/HIGH ADDRESS
1770     STA VTIMR2+1 FOR INTERRUPT
1780     LDA #$A8
1790     STA $D203   SET VOLUME
1800     LDA #0      ZERO THE REAL TIM
E CLOCK
1810     STA RTCLOCK
1820     STA RTCLOCK+1
1830     STA RTCLOCK+2
1840     STA POKE1   ZERO COUNTERS
1850     STA POKE1+1
1860     STA POKE1+2
1870     LDA POKMSK  GET IRQ MASK
1880     ORA #$02    ENABLE TIMER 2
1890     STA POKMSK  SAVE MASK
1900     STA $D20E   TELL HARDWARE
1910     LDA AUDCTLS GET AUDCTL SETTIN
G
1920     STA $D208   SET AUDCTL
1930     LDA AUDF1   GET SETTING TO US
E
1940     STA $D200   SET AUDF1 TO VALU
E
1950     STA $D209   START TIMER
1960 ;WAIT FOR 2 REAL TIME SECONDS
1970 ;SO IT WILL BE EASY TO GET THE
1980 ;NUMBER OF INTERRUPTS PER SEC
1990 ;BY SHIFTING RIGHT 1 BIT. THE
2000 ;VALUE OF RTCLOCK IS 120 AFTER
2010 ;2 SECONDS REAL TIME.
2020 M1  LDA RTCLOCK+2
2030     CMP #120    ?WAS IT 2 SEC
2040     BNE M1
2050     INC SW      TURN ON SWITCH TO
 STOP
2060 M2  LDA SW      WAIT TILL ZERO
2070     BNE M2      TO KNOW IT FINISH
ED
2080     RTS         RETURN NOW
2090 ;POKEY INTERRUPT EXIT GETS
2100 ;CONTROL WHEN AUDIO REGISTER
2110 ;COUNTS DOWN TO ZERO.  THE
2120 ;INTERRUPT IS RESTARTED UNTIL
2130 ;2 SEC HAVE TRANSPIRED AND WE
2140 ;ARE STOPPED COLD.
2150 EXIT INC POKE1
```

continued on page 106

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HOKEY POKEY INTERRUPTS *continued from page 103*

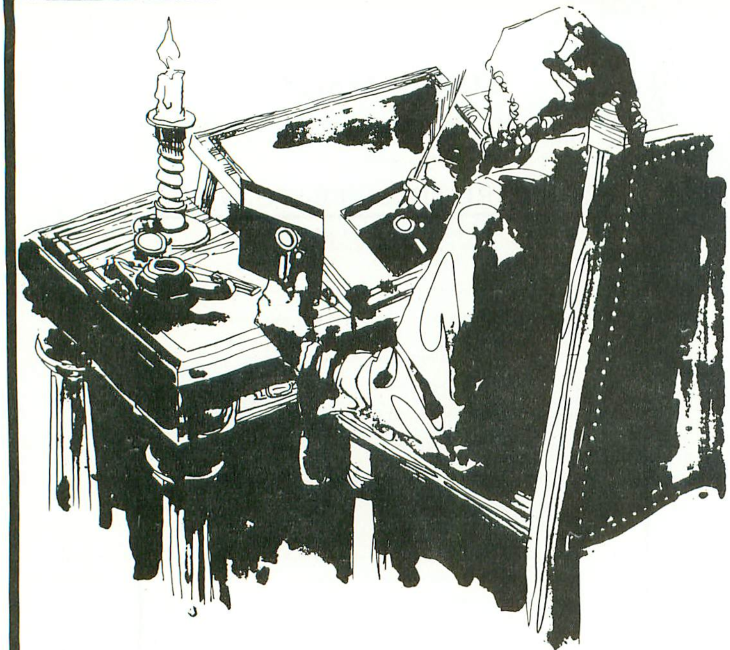
```
2160     BNE EX1
2170     INC POKE1+1
2180     BNE EX1
2190     INC POKE1+2
2200 EX1 LDA SW
2210     BNE EX3
2220     STA $D209   START IT UP AGAIN
2230     PLA
2240     RTI
2250 EX3 LDA POKMSK
2260     AND #$FD    TURN OFF POKEY TI
MER 2
2270     STA POKMSK
2280     STA $D20E
2290     DEC SW      RESET TO ZERO
2300     PLA
2310     RTI
2320 ;HIGH-MED-LOW ORDER
2330 POKE1 .BYTE 0,0,0
2340 SW   .BYTE 0
2350 NBITS .BYTE 0   WORK BYTE
2360 LENGTH .BYTE 3  FOR HEX CONV RTN
2370 PTR =    $80    FOR HEX CONV RTN
2380 ;CONVERT INTERRUPT COUNT DATA
2390 ;TO ASCII AND PUT TO SCREEN
2410 CONV LDA AUDF2  GET VALUE
2420     TAX         SAVE A
2430     AND #$F0    HIGH NIBBLE
2440     LSR A
2450     LSR A
2460     LSR A
2470     LSR A       SHIFT DOWN
2480     JSR NASCII  CONVERT IT
2490     STA AUDFM   SAVE IT
2500     TXA         RESTORE A
2510     AND #$0F    GET LOW NIBBLE
2520     JSR NASCII  CONVERT TO HEX
2530     STA AUDFM+1 SAVE IT
2540     LDA AUDF1   GET VALUE
2550     TAX         SAVE A
2560     AND #$F0    HIGH NIBBLE
2570     LSR A
2580     LSR A
2590     LSR A
2600     LSR A       SHIFT DOWN
2610     JSR NASCII  CONVERT IT
2620     STA AUDFM+2 SAVE IT
2630     TXA         RESTORE A
2640     AND #$0F    GET LOW NIBBLE
2650     JSR NASCII  CONVERT TO HEX
2660     STA AUDFM+3 SAVE IT
2670     LDY #9      LOOP COUNT
2680     LDA #'      GET A BLANK
2690 CONV1 STA IFREQM,Y CLEAR
2710     DEY
2720     BNE CONV1   CONTINUE
2730 ;DIVIDE INTR COUNT BY 2 TO GET
2740 ;COUNT OF INTERRUPTS PER SEC
2750 ;DO THIS BY USING A 1 BIT SHIFT
2760     LDA #1      SAY 1 BIT
2770     STA NBITS   SAVE IT
2780     LDA #POKE1&LOW
2790     STA PTR
2800     LDA #POKE1/HIGH
2810     STA PTR+1   SAVE ADDR OF FIEL
D
2820     LDA PTR
2830     BNE MPLSR1
2840     DEC PTR+1
2850 MPLSR1 DEC PTR
2860 LSRLP LDY LENGTH
2870     CLC
2880 LOOP LDA (PTR),Y GET A BYTE
2890     ROR A
2900     STA (PTR),Y
2910     DEY
2920     BNE LOOP    DO ALL BYTES
2930     DEC NBITS
2940     BNE LSRLP   DO ALL BITS
2950 ;CONVERT ANSWER TO FP
2960     LDA POKE1
2970     STA FR0
2980     LDA POKE1+1
2990     STA FR0+1
3000     JSR IFP     INT-->FP CONVERSI
ON
3010     JSR FASC    FP-->ASC CONVERSI
ON
3020     LDY #$FF    START INDEX VALUE
3030 FBI INY
3040     LDA (INBUFF),Y GET ASCII
3050     STA IFREQM,Y SAVE IT
3060     BPL FBI     CONTINUE
3070     AND #$7F    FIX HI BIT
3080     STA IFREQM,Y RESTORE LAST ONE
3370     LDA #MSGE   LENGTH OF MESSAGE
3380     LDY #AUDMSG&LOW
3390     LDX #AUDMSG/HIGH
3400     JSR MSGOUT  PUT IT OUT
3410     RTS
3420 ;BIN-->ASCII HEX SUBRTN
3430 NASCII CMP #10
3440     BCC NAS1
3450     CLC
3460     ADC #7
3470 NAS1 ADC #'0
3480     RTS
```



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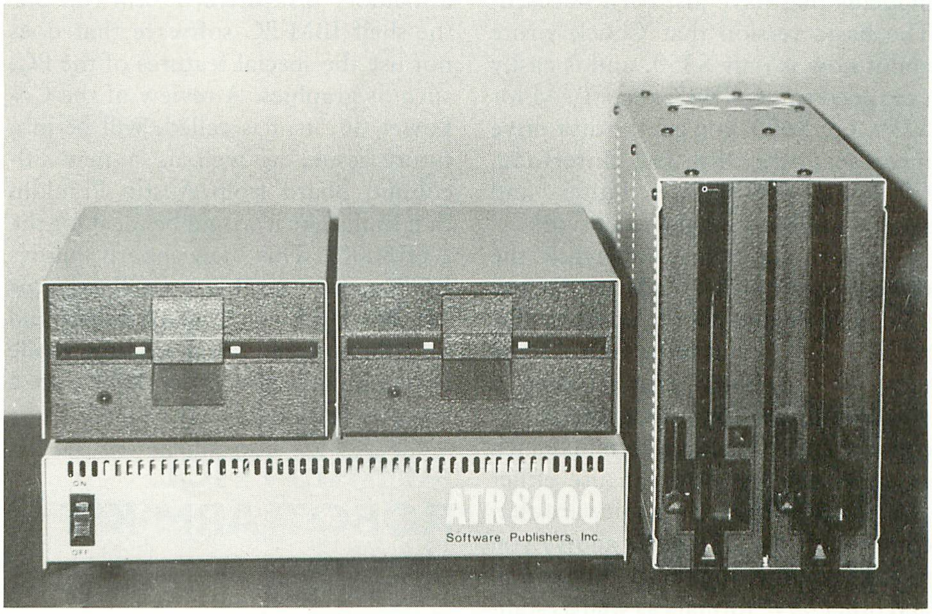
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$349.00, 16K — for single and double density
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Reviewed by
Chuck Skinner — 16K version
Mike Dunn — 64K version



16K Version

Most of you have seen advertisements for the ATR8000, produced by Software Publishers. I saw them, and was pretty curious about the whole affair. After all, those ads promise CP/M, 64K, double-density disks, and a lot more.

I went to the company's plant in Richardson, Texas, and after asking a lot of questions, I bought one of their miracle boxes. Now that I've used it for a couple of weeks, here's what I can tell you about it.

The ATR8000 is a complete 16K, Z80-based computer. It has no video output or keyboard of its own. It requires a terminal of some sort to operate. In this application, an ATARI is used as the terminal.

The operating system of the standard 16K unit causes it to act as an *interface* for the ATARI. You can use it to operate any standard disk drive (5¼″ or 8″), a parallel printer, and a serial device (a serial printer, modem, or whatever).

When updated to 64K, the system becomes capable of operating as a separate computer. CP/M-2.2 is included as an operating system and the ATARI serves as a terminal. When in this configuration, the system can always revert back to ATARI mode with the ATR8000 acting as an interface.

OS/A+ (Optimized Systems Software, Inc.) is available from Software Publishers in a version that works with the ATR8000. When operating with OS/A+, the system will support double-density disks. Atari DOS patched for double-density will also work, and of course, CP/M also supports double-density.

I purchased a Tandon TM-100-1 drive from CompuAdd in Austin, Texas, together with an enclosure and power supply. The ATR8000 owner's manual, which is very complete, told me everything I needed to know to connect the drive into the system, and *voila!*, it works. I have only the 16K system, but I won't hesitate to order the 64K upgrade as soon as I can afford it.

There are a couple of warnings to the prospective buyer. First, if you're thinking about buying an ATR8000 instead of an Atari 850 Interface, be aware that communications software designed for the 850 and a modem won't work. This is because the ATR8000's RS-232 port can't be accessed by the "R:" I/O command like the 850's can. Software Publishers say they are working on a solution, but at present, you either get the 64K version and use CP/M communications software (included), or use an 850 along with the ATR8000. SP promises to have an ATARI communication program available soon.

Second, if you currently have Atari 810 drives, they will have limited use. They will work fine with the ATR if you're using Atari DOS, and they will run single-density with OS/A+, but they will not operate at all if you're running CP/M.

One other device that SP showed me is a co-processor board they call the Co-Power-88. This allows adding an 8088 processor and additional memory to any Z80-based system, including the ATR8000. Think about it for a moment . . . a tri-processor, 16-bit, 256K, CP/M-86 ATARI . . . hmmm . . .

64K Version

I also bought one of the first ATR8000 interfaces, but mine is the full-blown 64K model with CP/M. The first units did have some bugs, ones that are typical of a brand new product. Software Publishers have been extraordinarily helpful to new owners and have fixed the bugs by coming out with a new ROM shipped free to them. It now will read all Atari disks, even protected ones, and the software for

continued on next page

modems that have just been released. The basic version that Chuck wrote about now is only $350, and is easily expanded to a full 64K and CP/M for $250. For $600, you get the disk drive interface, the RS-232 interface, CP/M, a 64K printer buffer, and several utilities to make it all work.

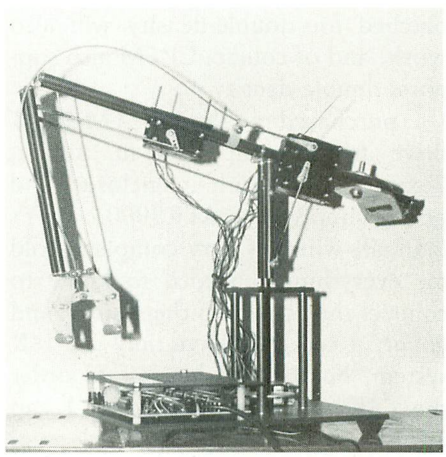
When you boot in an Atari disk, the drive automatically reads it. To use CP/M you either boot in an Atari Terminal program that turns your ATARI into an 80-column terminal with 2 40-column windows that scroll, or connect any 80-column terminal such as an ADM 3A. You can use either 5¼″ or 8″ drives, and software that comes with the ATR8000 allows you to run Osborne, KayPro II, Xerox 620 and other 5¼″ formats as well as standard single density 8″ disks. I have successfully run Osborne and KayPro disks that were not machine-dependent. The terminal program for the ATARI works, but the dual 40-column format is not very satisfactory — a regular 80-column terminal would be much better.

CP/M is much more versatile than the ATARI, but also much more difficult to use. Most people who buy CP/M computers either get it from a system house and have the programs configured to their needs, or are programmers. I cannot imagine how a beginner, as I was when I first bought my ATARI, could get their new Osborne or KayPro to run! The ATR8000 with CP/M is a good buy for someone who wants to use the excellent software available for CP/M as well as have an ATARI for games and use the same disk drives, printers and other peripherals. The basic unit for only $350 is an even better buy if you have no need for CP/M.

For a really deluxe setup, SP has just released an add-on kit that allows you to run 8086 based programs with MS-DOS or CPM-86 as well. This comes with from 64K to 256K of memory, that in the CP/M mode can be used as a memory disk drive. It will run off-the-shelf IBM-PC software that does not use the special features of the PC, such as graphics. A review of the Co-Power 86, as it is called, will be in a future issue, as well as a new 80-column board from Austin Franklin that looks like it would be ideal for the ATR8000. This new board allows RGB output, so that a RGB monitor can be used for both color games and 80 columns, and has a terminal mode that emulates the DEC 101A, so a separate terminal is not needed.

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Reviewed by Alan Filipski

For a long time I have wanted to build a robot capable of manipulating objects or moving itself around, but I never had sufficient mechanical know-how or resources. As a professional software developer for several years, I have confidence that once I understand a software problem I can write the program required to solve it. Mechanical gadgets, however, are another story.

Recently I saw an ad for a robot arm kit at a reasonable price complete with an interface to my ATARI 800. I called Myotis Systems in Tucson late on a Friday afternoon with my order, and the following Tuesday my kit was delivered. When I opened it I was a bit intimidated. There were ten plastic bags containing what seemed like thousands of small pieces: tubes, cables, motors, gears, nuts, bolts, rods, and many unnameable tiny plastic and metal parts, not to mention diskettes, manuals, and amusing bumper stickers. (I had also ordered a copy of Valforth at the same time).

Armed with the Myotis assembly manual and a few small hand tools, I started to work. I found the manual to be very well written. The task of describing fairly complex assemblies to readers who probably aren't even familiar with the names of the parts is formidable, but was carried out with precision.

The total assembly task took me about 40 hours — spread out over about three weeks. A person skilled in this sort of assembly could probably do the job in a third of the time, but I was in no particular hurry. After all, I bought the kit for the pleasure of putting it together. Workmanship is really the key to successful assembly of this kit. Many of the operations involve adjusting and fitting, and sloppiness here will result in a sloppy product.

The instructions with the kit recommend that you have screwdrivers, long-nose pliers, wire cutters, hand drill, sanding block, knife, soldering iron, and file. I also found nut drivers, locking pliers, wire strippers, a small Allen wrench, socket wrenches, and cyanoacrylate glue extremely useful. A small bench vise proved handy, and I even found a use for some K-Y jelly (to help slip some rubber tubing over the hand's grippers). Twice during assembly, I needed to call Myotis for help: once I had misread the instructions and ruined a small part; the other time I simply couldn't find one of the parts I was supposed to have. The person I talked to on the phone was courteous

and helpful and mailed the parts to me immediately free of charge.

It was a pleasure to construct something as nicely engineered as the Apprentice. The main structural components, for example are fabricated out of aluminum tubing originally intended for hunting arrows. The motive power is supplied by "servos". These are small plastic boxes, each containing a hobby-type motor, a gear train, and a small potentiometer (pot), a short driveshaft protrudes from the servo. The pot supplies feedback to the computer as to the actual position of the drive shaft. In two cases (shoulder and elbow), the drive shafts have small arms mounted on them which actuate pushrods connected to various parts of the frame. The same type of servo is used to control the hand's opening and closing via a cable, and the rotation of the base via a friction drive arrangement. This gives a total of four degrees of freedom. The wrist is controlled by a linkage which keeps the hand always facing downward, as if to pick up an object. Two additional kinds of motion would be desirable: wrist flexion/extension and wrist rotation. The former could be arranged fairly easily by buying some more parts from Myotis; the rotation looks like it might be quite a bit more difficult to arrange.

This brings up one of the more remarkable features of the Apprentice, and that is its ability to be modified and extended. The parts of the Apprentice are not constrained to fit together in only one way. The system is flexible enough to allow much re-engineering by the user. It would be possible to take the Apprentice completely apart and build something quite different from the parts. Lesser degrees of customization are also possible, but even these require some experimentation. For example, I noticed that shoulder movement which lowered the hand was much quicker than shoulder movement which raised the hand. To remedy this, and to allow heavier objects to be picked up, I added a counterweight behind the shoulder. This had the desired effect, but it also increased the moment of inertia of the system about the vertical axis; this just means that it's harder to start and stop turning. Sometimes this caused oscillations, as the rotation servo keeps correcting and overshooting its window. As a consequence, the arm would develop a temporary tremor. The solution: either reduce the counterweight or modify the control software. To me, the real value of the robot arm is to experiment and learn in this way.

A word about the software: Myotis supplies a diskette containing a simple robot control language called ROBIX. This language allows you to remember a sequence of arm positions and then cause the arm to cycle through those positions. You can, under control of such a program or directly from the keyboard, make the Apprentice pick up objects weighing a few ounces and move them around within a radius of about a foot. The accuracy is more than sufficient to pick up small objects repeatedly from the same spot. ROBIX was implemented as a Forth program supplied in object form. I found this language quite inadequate, though, for the type of software customization I wanted to perform. However, listings of the machine-language drivers are available, and the people at Myotis say that a more advanced robot control language, embedded in Forth, will be available soon.

If you are looking for a robot to fetch your slippers or wash your dog, hang on to your money for the next twenty or thirty years. If, on the other hand, you want a peripheral for your ATARI which will provide many hours of enjoyable tinkering and may teach you something about dynamic systems and feedback control, by all means consider the Apprentice. One dollar and a stamped self-addressed envelope to Myotis will get you a brochure.

ADVENTURELAND

Adventure International
P.O. Box 3435
Longwood, FL 32750
$39.95, 48K — diskette

Reviewed by Chris Chabris

This is the first in the series of Scott Adams' graphic adventure games and its plot is the same as the original all-text adventure of the same name. You wander about an enchanted world, encountering strange beings, objects, and situations, seeking various treasures. You win by recovering all of the 13 treasures and depositing them in a special location which you must discover during play.

In **Adventureland**, as in most graphic adventures, you accomplish your goal by looking at the graphic representation of your surroundings, reading the descriptions given, and typing one or two-word commands, such as GO NORTH, GET LAMP, or HELP. This program boasts a vocabulary of over 120 words, and will tell you if it doesn't understand your input. The vocabulary's limitations are annoying when you are trying to say something and must struggle to express it in two words that the program understands. Of course, the vocabulary includes all the words necessary to complete the adventure.

The pictures and overall graphic display system of this program are excellent. Each location in the world has its own picture, which is drawn in the Antic "E" mode (Graphics 7+) and occupies the top half of the screen. The bottom half of the screen is reserved for text input and computer responses. To see the text descriptions of the area, which includes a helpful list of possible exits from the current location, you need only press [RETURN]. This causes the picture to vanish and be replaced by another half-screen of text, producing a Graphics 0 screen. Pressing [RETURN] again returns the picture. In addition, a script character display is available at the press of a key. This font is very readable and enhances the flavor of the adventure.

The pictures themselves are very good, with multiple colors and textures in great detail. I have only two minor complaints about them. First, some of the colors are annoying when they flicker, which is probably a result of the successful attempt to put so many of the them on the screen at once. Second, the entire screen flickers in different colors when a new picture loads.

On the positive side, these pictures load very quickly for ATARI disk drives. All objects are drawn on the screen and erased when removed from the particular location. Many of them have their own close-up views, which are done extremely well. My favorite graphics feature is the INVENTORY command, which draws a picture of the adventurer dumping things out of a sack and then draws the objects you're carrying one by one.

Additional features include a printer option that allows you to produce a hard copy of the adventure as you go along, and a speech synthesizer capability. Unfortunately, the only synthesizer supported is the Votrax Type 'n Talk, which I do not own. I imagine that this feature, which can be toggled on and off with one keystroke and speaks the answers to your commands, is very helpful.

At the beginning of the session, a "margin adjustment" screen is provided, allowing you to alter the margins with cursors until the text fits in your display screen. I found this feature very helpful, as the picture on my TV screen is not perfectly centered.

The program's text displays are its only real weaknesses. The spelling is not good and the grammar used is terrible, and this has occasionally interfered with my understanding of the computer's descriptions and responses. However, the quality of the pictures, despite the slight flicker, and of the script character set, more than compensate for this small problem.

Documentation is provided in a small 12-page booklet that contains the instructions for both the Apple and ATARI versions of the game. It is quite complete, including boot-up directions, which are extensive for the ATARI version if a printer and the Votrax speech synthesizer are used; several one-letter commands; and a short "Playing Hints" section. I was pleased to also find information on making maps of adventures.

My recommendation to you depends on whether or not you have already played this adventure in its original incarnation. If you have, see the program demonstrated at a computer store and decide whether the excellent graphics enhance the program enough to warrant paying $40.00 for this new version. If you haven't played Adventureland yet and enjoy adventuring, by all means buy this program!

THE PHAROAH'S CURSE

Synapse Software
5521 Central Avenue, Suite 200
Richmond, CA 94804
(415) 527-7751
$34.95, 16K—cartridge

Reviewed by Roy D. Wolford

The Pharoah's Curse is an action adventure game that will keep you entertained for hours on end. It combines the puzzle elements of adventuring with joystick control over your player. You search for treasures and avoid dangers in the colorful crypts beneath the golden pyramid of the Saharah.

The object of the game is to descend into the pyramid, collect all the treasures, one hidden in each of the 16 lavishly decorated chambers, then to reemerge on the surface where you will be rewarded with a secret code which

allows you to play at the next level of difficulty.

There are four levels of difficulty (0-3). In each successive level, the action is faster and the tomb's guardians are quicker and more aggressive.

Action begins on Level Zero outside the pyramid. The intrepid archeologist (you) must enter through the top of the pyramid and descend into the first chamber. Movement techniques are not clearly explained in the instructions. The character moves left or right by pushing the joystick in the direction you want to move. To climb, push the joystick forward. To jump left, push the joystick diagonally forward and left. To jump right, push the stick diagonally up and to the right. For longer jumps, hold the firebutton down and push the joystick diagonally in the direction you want to jump. All downward motion is free-fall and no harm will occur to you as a result. Bullets can be fired in the horizontal direction by pressing the firebutton and pointing the joystick in the direction you wish to fire. Your gun is an effective weapon that will momentarily stun (dematerialize) your pursuers, to give you time to get a treasure or escape to another chamber.

Once inside the pyramid your task is to collect the treasures stored in each chamber. There are 16 chambers each containing one prize which you collect by touching it. Every time you collect a treasure you are rewarded with an extra life. Each chamber is protected by hidden floor traps which you must avoid. Being struck by one of the "things" that lurk beneath the ground will result in death. If you are not swift in securing the treasure, the dreaded Pharaoh and his servant The Mummy will materialize and seek to destroy you.

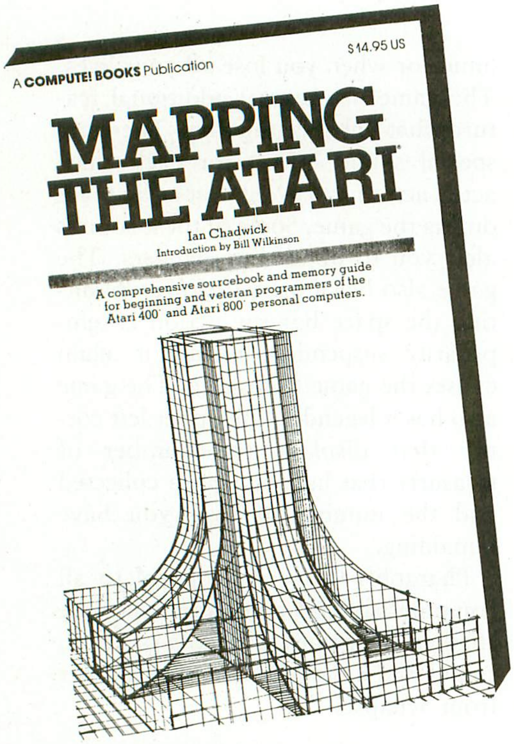
The Winged Avenger is an evil fowl you usually want to avoid because it likes to snatch you up in its talons and carry you off to another area of the tomb.

All the treasures are located in areas difficult to access. You must use your cunning to reach these areas by running and leaping around obstacles, jumping over pits, and climbing magic ropes. In some of the chambers you will find keys. Pick these to gain access to chambers hidden behind secret doors. All of the chambers have multiple entry and exit points. Some are sealed off by doors. From time to time a crown or arrow will appear. Touching the crown will endow you with another life. Being hit by the arrow results in death.

Points are awarded for shooting the Pharaoh, Mummy and Winged Avenger. Points are also obtained for entering the pyramid, and collecting each treasure and key.

The game ends when you collect all the treasures and emerge from the pyramid, or when you lose all your lives. The game has several additional features that enhance the play. There are special sound effects for each character, action and event that takes place during the game. Some of these sounds alert you to impending dangers. The game also has a pause feature. By hitting the space bar the action is temporarily suspended; hitting it again causes the game to resume. The game also has a legend in the upper left corner that displays the number of treasures that have not been collected and the number of lives you have remaining.

Pharaoh's Curse will appeal to all computerists and gamesters who like challenging games with lots of color, sound and action. It's another winner from Synapse.



MAPPING THE ATARI

COMPUTE! Books
P.O. Box 5406
Greensboro, NC 27403
$14.95

Reviewed by Robert Kawaranti

This book will appeal primarily to the little "hacker" in the heart of those ATARI users who view their beloved microcomputer as more than a tool or a game playing toy. It provides a comprehensive listing and description of memory locations for the ATARI 800 and 400. While not intended as a total replacement for such volumes as the Operating System User's Manual, Hardware Manual, Operating Systems Listing, Disk Utilities Listing, and De Re ATARI from Atari, the average user will find information much more accessible in **Mapping the ATARI** because of its logical organization and excellent indexes. The fact that the book is primarily written in plain English makes the information easier to absorb than in the Atari publications.

The text begins with a preface by the author which is an excellent orientation to the use of the memory map. An added bonus is the short introduction by Bill Wilkinson which provides the reader with a mini-tutorial on memory access using several of the languages available for ATARI computers.

The memory map is laid out sequentially from location 1 to location 65528 with a description of the function or lack of function of each location. The decimal and hexadecimal representation for each location is provided as well as the labels for locations, registers, subroutines, and vectors in the ATARI. The thoroughness of the coverage of labels is indicated by the four page plus (double column) index of labels and their locations. A detailed subject index is also provided which allows the user to identify the memory locations that are relevant to the question at hand. Relatively detailed descriptions including short example application programs are provided for a number of the more interesting locations. The discussion attached to location 756, Character Base Register, is one example of the encyclopedic nature of Mapping the ATARI. A cogent discussion of the role of this location and altered character sets is presented. The process of creating altered character sets is explained concisely and the appropriate precautions to take to avoid problems such as overlapping Player/Missile graphics are outlined. As with other locations, references to the appropriate manuals, magazines articles, and appropriate utility programs are provided.

The discussion of the functions and memory locations used by the C/GTIA, POKEY, ANTIC, and PIA provides one of the best overviews I have found to date of the chips that make the ATARI special.

The discussion of the functions and memory locations used by the C/GTIA, POKEY, ANTIC, and PIA provides one of the best overviews I have found to date of the chips that make the ATARI special. The extensive cross referencing to relevant memory locations is obviously very useful to programmers. The BASIC ROM memory locations are only sketchily discussed, but most users will probably have little need to be accessing these locations.

Although the book will be most useful to serious programmers who need to access various memory locations, it will also appeal to ATARI users like myself who are curious about the inner workings of their machine. The beginner may be slightly intimidated initially by the nomenclature, but Mapping the ATARI is very clearly written and is by far the most convenient source for most of the material covered. While it is not really intended for casual reading, I have spent a number of hours leafing through the book and reading sections as they caught my fancy. A definite must for the bookshelf of the serious ATARI user.

WARLOCK'S REVENGE

Synergistic Software
830 N. Riverside Dr., Suite 201
Renton, WA 98055
(206) 226-3216
$34.95, 48K—diskettes (2)

Reviewed by Harvey Bernstein

Adventure game fans of my acquaintance seem to disagree about graphic adventures. Some feel that high resolution graphics enhance the overall ex-

perience, while others prefer the more "pure" form of the all-text adventure, claiming that graphics can never match the adventurer's imagination. While for the most part text adventures feature tougher "puzzle-solving elements", very few things can substitute for ATARI graphics. Unfortunately, most so-called "high-res" adventures, with multi-colored screens in GRAPHICS 7 look like they were drawn by a five-year-old. I am pleased to report that **Warlock's Revenge** is an exception.

Some feel that high resolution graphics enhance the overall experience, while others prefer the more "pure" form of the all-text adventure, claiming that graphics can never match the adventurer's imagination.

Warlock's Revenge features over 100 screens in GRAPHICS 8! If the limited color availability sounds like a handicap, fear not. Excellent use is made of both perspective and artifacting, which creates, in some cases, some very nice effects.

So, you ask, how is the game? That, as they say, is the rub. Warlock's Revenge presents the by now cliche challenge of leading a party of adventurers (elf, thief, gladiator, etc.) on a quest after treasure hidden by Oldorf, an evil (what else?) warlock. The game is played with two disks and the action covers four locations.

Each member of your party has certain abilities, but has to be leading the expedition in order to be used. For example, the Wizard must be in the lead in order to cast a spell. The only problem is that each of the seven characters can be used a total of five times, and is then retired. The challenge, then, is to use your characters in the most effective manner. It is most frustrating to come across a lock that needs picking after the Thief is no longer available. The commands are entered in the standard one or two word format, such as OPEN DOOR, and directions are abbreviated, also standard in games of this kind.

The puzzles and dangers in Warlock's Revenge are not very difficult, and, in fact, there is no real chance of getting killed, unlike more complex adventures. For this reason, I would hesitate to recommend Warlock's Revenge to the more experienced adventurer. However, for the young, the novice, or the just plain timid of heart, Warlock's Revenge is a fine introduction to the exciting world of adventure games.

HAPPY 810 ENHANCEMENT

Happy Computing
P.O. Box 32331
San Jose, CA 95152
(408) 251-6603
$249.95

Reviewed by David Duberman

The difference between a normal ATARI 810 Disk Drive and one equipped with Happy is like the contrast between mass transit and the automobile. A car costs you more initially, but improves the quality of your life. Similarly, if you use your disk drive a lot, installing Happy will markedly enhance your programming life.

The Input/Output port on the ATARI conducts data serially—one bit at a time. This is why programs load

continued on next page

more slowly on an ATARI than on an Apple or a CP/M micro (but faster than Commodore!). Those others use parallel data transfer, something that is very difficult and costly to implement on the ATARI in its current incarnations. Until Atari changes this design, Happy offers the only product on the market that significantly improves the speed of data transfer for the ATARI at a reasonable cost.

The **Happy 810 ECT** requires a modicum of technical proficiency to install. It comes in the form of a circuit board that is plugged into the side board in your 810. No soldering is necessary, but you must remove and plug in a few Integrated Circuit chips. If you do not care to undertake the process, consult an electronics service center.

Happy's secret lies in a track-sized buffer. Normally with the 810 when you command your computer to load a file, it signals the disk drive, which first determines where on the disk the file lies. The drive then reads the first sector, a unit of disk storage containing 125 or 128 bytes of data. Sectors are organized into 40 concentric tracks of 18 sectors each. The contents of the sector are stored in the drive's internal sector-sized buffer, or memory. The drive then sends the contents of the buffer to the computer, and proceeds to determine, search and read the next sector. The disk is spinning, so it takes some time to find each succeeding sector—only a fraction of a second, but this time adds up. Atari's fast-formatting scheme can help under some circumstances, but has various problems, as are carefully detailed in Happy's extensive literature.

When a read operation is requested for any sector from a drive equipped with the 810 ECT, the entire track containing that sector is read into a buffer within the disk drive, usually with just 1.05 revolutions of the disk. In most cases, contiguous sectors will be requested, and since the next 17 are already in the drive's memory, no added search time is necessary. Thus, loading speed can double or triple.

Faster loading results in decreased running time of your disk drive, and therefore, reduced wear. The most significant reduction of running time occurs with disk-intensive applications such as databases and adventure games. You may notice with such programs that an un-Happy drive often spins for a long time, even though the beeps from your speaker signify that readings are few and far between. This is because the program must process your data as it reads it, instead of being able to read it all at once. With 810 ECT installed, you will still hear the infrequent beeps, but the drive will stop spinning most of the time, because most of the necessary data is already in the drive's buffer. Forth users, as well, can achieve a reduction of disk running time of up to 80%.

By itself, Happy cannot improve the speed of writing sectors to the disk. However, this capability can be harnessed with special software.

If you have an older 810 drive, you can benefit even more from 810 ECT. The recent improvements of fast formatting and clock/data separation circuitry have been included.

Two last items. The 810 ECT reduces by approximately ⅓ the time required to initialize a disk using the DOS initialize command. Also, Happy further caters to impatient computerists by reducing the time delay for the drive to stop spinning after I/O from six records to four.

OMNIMON

CDY Consulting
421 Hanbee
Richardson, TX 75080
(214) 235-2146
$89.95

Reviewed by David Duberman

Omnimon by David Young is a machine-language monitor that should have come with the ATARI. In fact, every microcomputer should have this sort of hardware-based monitor installed. Most, however, do not. Now, for a relatively low cost, you can equip your ATARI 400/800 with a truly sophisticated programming tool.

Whether you're an experienced programmer or a wondering beginner, Omnimon can, if wisely used, help you to fully understand the working of your computer. A monitor is, as its name suggests, a program which provides a means of examining memory. Additional capabilities may include alteration and disassembly of memory, examination and alteration of the CPU registers, and disk capabilities. Omnimon does all these and much more.

If you have an assembler, you probably already have a software-based, machine-language monitor. This is entered by the command "DEBUG" from the Atari Assembler Editor cartridge and by "MON" from Synassembler. These monitors are very useful within their limits, but their operation is intimately linked to that of the assembler, so they can't be used to trace most software.

Omnimon's primary feature is that it is resident in the ATARI's hardware and can be accessed at any time, from any program, by pressing [SYSTEM RESET] simultaneously with either [OPTION] or [SELECT]. In addition, you may reenter the program at the point from which you exited, or any other point. Omnimon takes the form of an IC chip which is addressed at hexidecimal $COOO to $CFFF, a 4K range which is not used by the ATARI 400/800 Operating System. The chip is available in two forms: it comes with Newell Industries' Ramrod OS board, which has a socket to accommodate it, or it can be installed on your ATARI 400/800 OS board with a minimum of difficulty. If purchased sans Ramrod, Omnimon comes with a piggyback board which provides it with a socket. In addition, a wire from the piggyback board must be connected to a pin on the floating-point ROM chip. No soldering is necessary.

Omnimon's capabilities are far too extensive to be covered meaningfully in this limited space. First and foremost is a 'HELP' command which prints a list of commands and necessary parameters. You can search, display, and alter memory in hex or in ATASCII. You can execute memory (effectively a trace operation), and jump (JSR) to a subroutine. You can disassemble memory, perform disk I/O without the presence of DOS, send output to the printer, and a good deal more, as well.

Omnimon can bypass DOS and access disk functions at any time. Consider this example. You turn on the computer, not bothering with the disk drive because you don't think you'll need it. It turns out you do want to save your work, but you can't boot DOS without losing the program. With Omnimon, it's no problem. All you have to do is enter Omnimon, find and manually record the BASIC variable and program pointers (128 to 145; $80 to $91), and tell Omnimon to write the variable table and program memory to disk. If you don't have a disk ready (it's best to use a blank one with Omnimon—no DOS), the instructions tell you how to use the OS to format one. Then you boot DOS, enter Omnimon, reset the BASIC pointers to their original offsets (the values will differ), and load the program memory to the proper location. Reenter BASIC, and you can LIST, RUN, and SAVE your program in the normal way.

As friendly as Omnimon is, and it is friendly, its use assumes your familiarity with the many reference works on the ATARI. The more knowledge you possess concerning this highly complex computer's workings, the better equipped you will be to use Omnimon to harness the best and make it perform new wonders.

David Young, Omnimon's designer, has advised me of an advanced version of Omnimon which has hex conversion, verify, HAPPY-drive upload and download. Also, you can modify your OS board to allow a [SYSTEM RESET] even when the machine locks up. The advanced Omnimon can take advantage of this modification to allow you to perform a warmstart (thus retaining memory) when the keyboard is frozen. He will gladly send this and any other revision to any Omnimon owner for $10 to cover the cost of the EPROM and mailing.

EPSON FX-80 PRINTER

Epson America, Inc.
3415 Kashiwa St.
Torrance, CA 90505
(213) 539-9140
$745.00

Reviewed by Arthur Leyenberger

I recently bought an Epson FX-80 printer to use with my Atari 800. The FX-80 is a dot-matrix printer which operates at 160 characters per second, has both pin-feed and friction drives and is compatible with all software for the MX-80 F/T with Graftrax+.

In addition to the increase in speed (double that of previous printers), the FX-80 offers either a 2K print buffer or 2K RAM for a user-generated character set and a dipswitch compartment accessible from the right top rear. These switches allow you to choose

continued on next page

parallel, serial or RS-232 interfaces, and several kinds of electronic beeps signal error conditions. An internal 12K ROM yields seven different graphic modes which can be used to address certain pixels or with certain programs in particular modes. The maximum resolution of pixels per line is 640, designed to match the high-resolution monitor of Epson's QX-10 computer. It also features proportional spacing and elite (12 point) type.

The Epson FX-80 is the newest and most advanced of the Epson line. I am very pleased with this printer and feel it is definitely the printer of choice for the serious ATARI user. Not only has Epson produced a great piece of hardware, it has provided equally good documentation. The manual that accompanies this printer is excellent. Information is presented clearly and concisely, and examples are used where appropriate.

I do have a few criticisms, however, of the printer. For example, the FX-80 does not come with adjustable tractors. This means that if you want to make labels or generate narrower forms you need to buy an adjustable tractor feed attachment. This type of attachment is now available through Epson for an additional $40.

Another shortcoming lies in the sequence of information in the manual. While all the information you need is included in the instruction manual, it is presented in escape sequence order. So rather than looking under "E" for expanded print or "C" for compressed print, you have to look under "W" for [ESC] "W" to find the expanded print mode or "C" for [ESC] "C" for the compressed print mode.

Also, in the index of functions and codes, only the letters are given, not the decimal ASCII values. If you are using a word processor and want to give the ASCII codes to turn on the expanded mode you would have to: 1) check the index to determine which escape code to use (in this case, "W"), and 2) check an ASCII table to determine the decimal value for "W". It would have been a lot simpler if the decimal ASCII codes were listed alongside the character codes in the manual.

This printer is by far the most sophisticated and, in spite of its flaws, the best yet produced by Epson America.

B KEY 400

Inhome Software, Inc.
2485 Dunwin Drive, Unit 1
Mississauga, Ontario L5I 1T1
Canada
(416) 828-0775
$44.95

Reviewed by Richard De Vore

Those who own the ATARI 400 Home Computer often wish it had a better, more tactile keyboard. The **B KEY 400** keyboard from Inhome replaces the membrane keyboard inexpensively, and is easy to install.

Removing the membrane keyboard and replacing it with the B KEY 400 went exactly as specified in the instructions.

People unaccustomed to electronic tinkering are understandably wary of modifying anything as complex as a computer. Fortunately, the instructions with the B KEY 400 are clear and straightforward. Only a Phillips screwdriver is needed, though long-nosed pliers and an extra pair of hands are useful. Be aware that any modification of the ATARI voids the 90-day warranty, so you should exercise the computer thoroughly before doing this, or wait until the warranty expires.

Only four screws hold the computer case together, and the keyboard connector unplugs easily. Removing the membrane keyboard and replacing it with the B KEY 400 went exactly as specified in the instructions. You will probably want someone to hold the keyboard while you insert the connector. The new connector has rounded prongs rather than the flat ones that you find on the membrane connector. It also lacks the plastic stiffener, so insertion is harder than it first appears. I used long-nosed pliers to hold the connector straight while applying the needed pressure. Then I fitted the case back together, replaced the four screws, and got ready to install the keys.

Again, the instructions were clear. The only problem I had was with the space bar. This has a pivot wire that plugs into the keyboard switch. The wire stretches across the conductors on the circuit board. This caused a short on my unit so that when the computer was turned on, the space function was in full repeat. To solve this problem, I put a small piece of tape over the conductors and bent the pivot wire slightly upward in the middle. While this problem is not serious, it might confuse a layman, and I think Inhome should correct it.

The B KEY 400 keys are larger than the membrane keys, so the "function" keys have been crowded into the bottom of the keyboard. This is awkward at first, but the improvement is still worth it. I find the new keyboard makes typing much easier and more enjoyable, a viewpoint shared by another 400 owner who tried it.

Adding a keyboard is an option many ATARI 400 owners are considering, especially if they paid over $300. I think this keyboard, combined with one of the several available 48K memory boards, makes the 400 a very functional substitute for the higher-priced ATARI computers.

ATARI CLINIC

by STEVE SWITZER

Q. Where did you dig up this clown Switzer, and what's the idea of letting him use ANTIC to drum up business? I refer to his response to a question about cleaning disk drive heads in the ATARI CLINIC department of your May issue. He correctly recommends the use of cleaning sticks, then he tells the guy to use rubbing (isopropyl) alcohol. He should know rubbing alcohol has oils in it.* I suggest Mr. Switzer correct this error in his column at the earliest opportunity. I must also disagree with his recommendation against cleaning disks. I would expect that many ATARI users cannot accurately locate the disk-drive head while looking the drive door. I firmly believe that for any non-technical user, a brand-name cleaning disk . . . is far less likely to do damage than someone blindly poking around with a cleaning stick. **—Gary Crowell, CA**

A. Normally, I would not answer a letter with such insulting remarks, but this is an important area that I guess I should cover again. I take this column very seriously and I research the answers using my own people as well as qualified outside personnel. I am not using this column to promote myself or my business, it just so happens that outside of ATARI we are one of the most experienced service centers in the country. As to your information on isopropyl alcohol, to get an outside opinion I called an engineer at Tandon in Sunnyvale, CA. He told me that all he uses is isopropyl alcohol, and that he has never heard of any problems with it. I also asked him about cleaning disks and he said that they don't recommend them to anyone. If you don't believe this man or me, then take the chance of destroying the head on your drive and use a cleaning disk. And at the risk of promoting my business, when you burn out the head on your drive, send it to me and I'll be glad to replace it for you (for a price).

**Actually, Steve stipulated* isopropyl, *not rubbing alcohol. We editorially inserted "rubbing" in his copy to "clarify" his answer, and for this we apologize. Rubbing alcohol is not based on isopropyl, but on ethanol, and does contain oils and other chemicals that might damage heads.*

—ANTIC ED



Q. I have an older 810 and I am thinking about getting a data separator. Do you think it is worth the money? Also what does it do? **—G. Miller, CA**

A. The purpose of a data separator is for the drive to differentiate between the clock pulse and the data pulse. The 810 has a data separator built into the 1771 controller chip, but this doesn't work as well as it should. When we speak at user group meetings, I always recommend against spending the money on a data separator. The reason is, there has not yet been a drive that we couldn't get working perfectly without one.

Atari came out with the data separator because many drive owners were opening their drives and messing with the speed. The data separator allows you to read disks that are not written at precisely the right speed. By the way, most of the speed-adjustment programs out there don't work, and the ones that do don't update the screen fast enough to tell you if the speed is fluctuating rapidly (very important). Also, the speed of an 810 should be 288 rpm, not 300. Do not use the strobe hole on the bottom of the drive plate to adjust speed, because it is set up for 300 rpm.



Q. I took the memory board out of its plastic case on my ATARI 800. After I did this my computer started to lock-up during prolonged programming. What would cause this?

—Mr. Jesop, CA

A. Lock-up can be caused by many things. But your question explains exactly where your problems lie. The plastic case does two things: First, it physically stabilizes the board in the slot. When you remove the cover on your 800 to expose the memory boards, you will see that the plastic case sits in a track that doesn't allow the memory board to move. When you take off the plastic and put the PC board back, you will see that the board can wobble around. Typing on the keyboard sends vibrations throughout the entire computer. This can cause the unhoused boards to wiggle back and forth, sometimes disturbing the connection between the board the socket. On the new 800's, the memory board isn't cased in plastic, but Atari has installed a guide to hold the memory in place. The second thing the plastic case does is act as a "heat sink," that is, it allows the heat to dissipate evenly inside the computer.



Q. My keyboard worked fine until I bought Defender. Now I am having problems. **—Bob Day, IL**

A. The keyboard on your computer can only take so much. When I saw the way to activate the smart bomb on Defender, I knew there would be problems. People play Defender in my stores, and they slam their hand down hard on the space bar to set the smart bomb off. Even though the keyboard can take a lot of pounding I recommend that you be very gentle when using Defender or it will cost around $130.00 to get a new keyboard.

Computer Quiz

by GUY HURT



1. The number of colors available in Graphics Mode 5 is:
   (a) *5* (b) *4* (c) *6* (d) *3* (e) *none of these*

2. A written Atari program is checking the status of a joystick. A returned value of 15 means that the joystick is being pushed in:
   (a) *an upward direction*
   (b) *a downward direction*
   (c) *an upper, leftward direction*
   (d) *a rightward direction*
   (e) *none of the above*

3. When recording programs on tape, you should have fewer than _?_ seconds of leader.
   (a) *5* (b) *7* (c) *9* (d) *11* (e) *none of these*

4. A floating-point number consists of:
   (a) *mantissa and fraction*
   (b) *mantissa and exponent*
   (c) *fraction and floating point*
   (d) *exponent and characteristic*
   (e) *none of the above*

5. What value is returned to memory location 53279 if the START button is pressed?
   (a) *1* (b) *3* (c) *5* (d) *1* (e) *none of these*

6. Which of the following is TRUE? (For the ATARI)
   (a) *FOR/NEXT loops will run slower, the farther down they are located in a program*
   (b) *Although REM statements are ignored, they do take up memory space*
   (c) *All data values in DATA statements must be read at least once*
   (d) *two of the above*
   (d) *all of the above*
   (e) *none of the above*

7. In Atari Assembler, which status flag is NOT effected by the ADC mnemonic?
   (a) *N* (b) *V* (c) *Z* (d) *C* (e) *none of these*

8. What letter does the following BINARY REPRESENTATION identify?
   00000000
   00011000
   00111100
   01100110
   01100110
   01111110
   01100110
   00000000
   (a) *A* (b) *E* (c) *B* (d) *R* (e) *none of these*

9. On the ATARI, the frequency value 204 is the same as which natural musical note?
   (a) *C#* (b) *D#* (c) *C* (d) *D* (e) *none of these*

10. LOAD is to SAVE as ENTER is to:
- (a) LIST
- (b) *STORE*
- (c) *RUN*
- (d) *PEEK*
- (e) *none of these*

11. In the ATARI, the BASIC command POP:
- (a) *produces a short, snapping sound effect*
- (b) *causes BASIC to forget the most recent RETURN location*
- (c) *causes a program interruption*
- (d) *is always stored in a variable named COKE$*
- (e) *none of the above*

12. On the ATARI, the screen must be OPENED for which statement?
- (a) *GET*
- (b) *INPUT*
- (c) *PEEK*
- (d) *SEARCH*
- (e) *none of these*

13. Microminiature integrated circuitry was a feature introduced in WHAT generation of computers?
- (a) *1st*
- (b) *2nd*
- (c) *3rd*
- (d) *4th*
- (3) *none of these*

14. How many registers in the ATARI will indicate collisions?
(a) *4* (b) *5* (c) *15* (e) *none of these*

15. The POKEY chip is responsible for:
- (a) *converting POT resistances into numbers*
- (b) *keeping track of executed POKE statements*
- (c) *tallying the number of scan lines*
- (d) *monitoring selected capacitors*
- (e) *none of the above*

16. Suppose an ATARI system was delivered with 40K RAM. With the BASIC cartridge installed, and using Graphics Mode 0 (zero), but with no disk or interface, how much memory is available?
- (a) *34899 bytes*
- (b) *35899 bytes*
- (c) *36899 bytes*
- (d) *37899 bytes*
- (e) *none of these*

17. The maximum number of TEXT LINES possible on the ATARI is:
(a) *20* (b) *22* (c) *24* (d) *26* (e) *none of these*

18. Direct reference, indirect reference, base / displacement and indexing are ways to perform:
- (a) *computer arithmetic*
- (b) *word organization*
- (c) *memory accessing*
- (d) *all of the above*
- (e) *none of the above*

19. Which of the following will generate random integers between 10 and 100 inclusive?
- (a) *10 X=INT(RND(0)*100+1)–10*
- (b) *10 X=INT(RND(0)*100+1)–(RND(0)*10+1)*
- (c) *10 X=INT(RND(0)*90+1)+10*
- (d) *10 X=INT(RND(0)*91+1)+9*
- (e) *none of the above*

20. Based on the ATASCII Character Set, the character "+" has a HEX equivalent of:
(a) *2A* (b) *3B* (c) *2C* (d) *23* (e) *none of these*

21. Loop iteration and address modification use which of the following concepts?
- (a) *Base/displacement*
- (b) *Indirect addressing*
- (c) *Direct addressing*
- (d) *Indexing*
- (e) *none of the above*

22. In an Atari BASIC program is the statement: 10 DIM TEN(7). The number of addressable elements that TEN has is:
- (a) *variable*
- (b) *7*
- (c) *8*
- (d) *10*
- (e) *none of these*

23. An IF statement that would check to see if BOTH the firing buttons of the two left-most joysticks are being pressed (and stop if they are) would be:
- (a) *10 IF STRIG(1)=0 AND STRIG(2)=0 THEN STOP*
- (b) *10 IF STRIG(1)=1 AND STRIG(2)=1 THEN STOP*
- (c) *10 IF STRIG(0)=0 AND STRIG(1)=0 THEN STOP*
- (d) *10 IF STRIG(0)=1 AND STRIG(1)=1 THEN STOP*
- (e) *none of these*

24. There are two different kinds of interrupts with a 6502 CPU. They are:
- (a) *NMI and IRQ*
- (b) *NIM and IRQ*
- (c) *MNI and IRQ*
- (d) *MNI and IRQ*
- (e) *none of these*

25. In the Atari, 32767:
- (a) *is the largest addressable memory location*
- (b) *is the largest BASIC statement line number possible*
- (c) *is the value found in memory location 53257 after a collision has been detected*
- (d) *is the starting address of user memory*
- (e) *none of the above*

Answers

1. *b* 2. *e* 3. *b* 4. *b* 5. *d* 6. *d* 7. *e*
8. *a* 9. *b* 10. *a* 11. *b* 12. *a* 13. *c* 14. *e*
15. *a* 16. *d* 17. *c* 18. *c* 19. *d* 20. *e* 21. *d*
22. *c* 23. *c* 24. *a* 25. *b*

Atari PILOT for Beginners

Jim Conlan Tracy Deliman with Dymax
Reston Publishing Company, Inc.
Reston, Virginia 22090
Reviewed by Shoneen Gervich

There is a new breed of computer book out these days. I call them Champagne Flight books; they get you where you need to go, but all you remember were the giggles. *Atari PILOT for Beginners* by Jim Conlan and Tracy Deliman is an example of this increasingly popular style.

Atari PILOT for Beginners jets you through the rudiments of Atari PILOT, Atari's user-friendly language with Turtle Graphics, with the ease of whispering flight. The reader journeys through all the basics, plus the not-so-basics, with sassy cartoon characters and humorous programs.

For instance GR: really stands for Grover the Turtle. One program verifies that computers do get fleas, and somewhere out there is an Uncle Clem who gives clam leashes for Christmas so that little boys have to write thank-you notes. But lest you think this volume is only for children, I assure you it is not.

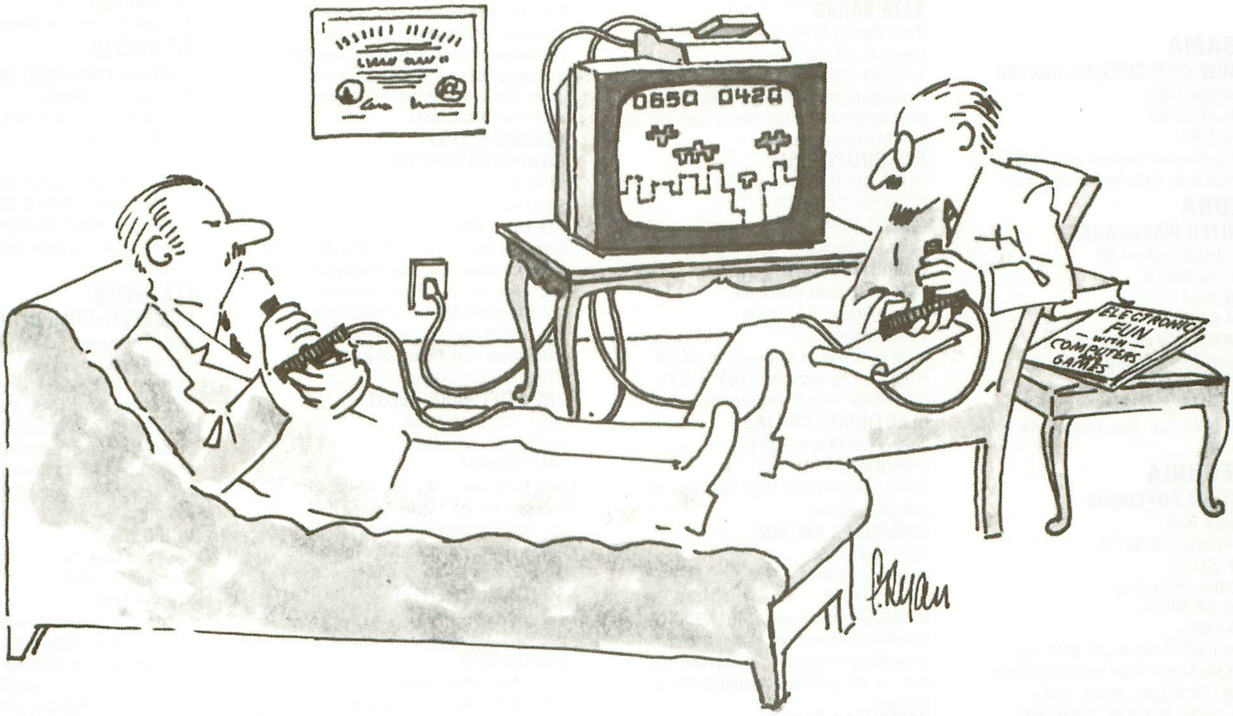
The overall structure of the book is highly original; some may find it objectionably so. In no way does it imitate either the Atari Student PILOT Reference Guide or the educator's PILOT Primer that accompany the PILOT cartridge. After an excellent keyboard orientation, the first programming done is with sound, utilizing monster music and music theory of chord components. Some might feel more comfortable venturing into simple T:ype and A:ccept commands first, as the Atari manuals do.

Now, in true critic-style, I feel obligated to point out some of the possible failings of this volume. The section on "The Number Chopper" (modulo) would have been more helpful if another few sentences of explanation had been added. The section on True/False (0,1) could have been elaborated. Understandably, though, an introductory volume of this size could not be comprehensive in delving into all aspects of PILOT. I also found it annoying that in their attempt to appeal to the beginner the writer purposely avoided using words such as "modulo" or "string indirection" which are used in the Atari PILOT Primer. The book also could have benefited from a better layout so the pages would not appear so crowded.

One advantage of this book over the Atari material is that it contains a reasonably-sized index. The volume goes into deeper explanation in some of the game and graphics applications than does the PILOT Primer, with much clearer and shorter examples, but is weaker than the Primer in the core-command areas. It has excellent sections on use of the joysticks, calculating "turtle" velocity, and writing interactive stories. The "Turtle Herding" and "Thrice Dice" programs are excellent examples demonstrating that most people really wouldn't hate math if they knew what to do with it.

On the title page of the volume, the authorship includes not only Conlan and Deliman but also credits Dymax. Dymax is a unique concept in the publishing world. It is a business concern serving both as an agent, support group and testing forum for authors of computer books. Dymax is even more though; it represents a style. Many of their books are in a similar vein to *Atari PILOT for Beginners* (Freeze-dried BASIC, Atari Games, etc.). If you dislike heavy computer tomes, then look for the Dymax label. They pride themselves on being able to deliver you on the flight from Novice City to Being There. You may not be an expert PILOT Programmer after this volume but you certainly won't complain that you didn't get service with a smile.

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8. Clewso: detective adventure, graphics

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3. Deathstar: from ANTIC #2
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6. Artillery: firing strategy game
7. Super Wumpus: text adventure

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2. Showdown
3. FROG: from ANTIC #3
4. Draw: Guy Hurt
5. Plus Zero
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NEW

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NEW

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4. Mastermind
5. Hamurabi: the classic simulation
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8. Aceyducy & more

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7. Printnop: connect parallel printer from jacks 3 & 4

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2. Typo: from ANTIC #3
3. Home inventory
4. KEY 6: Cipher coding
5. Renumber
6. Compare: listings for differences
7. SUPER: menu
8. Modem
9. RT clock & more

NEW

ANTIC UTILITIES DISK #3

1. Disassembler: from ANTIC V.2,#1
2. Tiny Text: from ANTIC #6
3. GTIA text window: from ANTIC V.2,#1
4. Label: disk label on Epson
5. Set up printer: sets up MX80 for Visicalc
6. Autotype: convert USR code to string
7. Autodata: convert USR code to DATA statements.
8. Keyboard: tutorial & more

ANTIC GRAPHICS DEMO #1

1. Spider: from ANTIC #3
2. Rainbow
3. Horses
4. ATARI logo
5. Oxygen
6. Spiral
7. Pretty
8. Message and more

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Requires Music Composer Cartridge

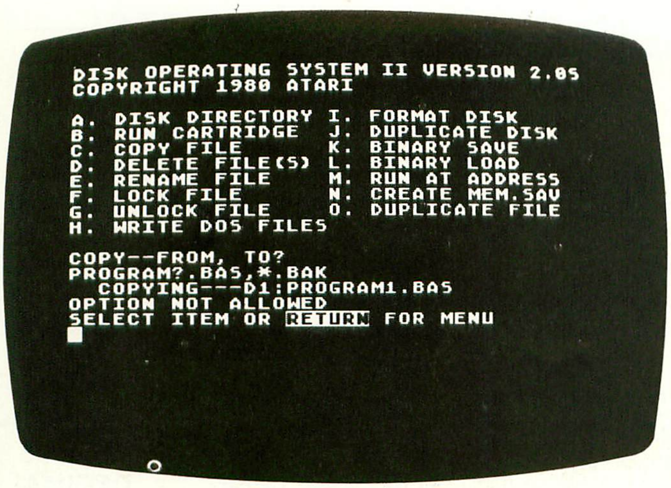
1. Prelude
2. Joplin
3. In My Life
4. Star Trek
5. Daisy
6. Greensleeves
7. Yellow Submarine, and many more

ANTIC GR. & SO. DEMO #1

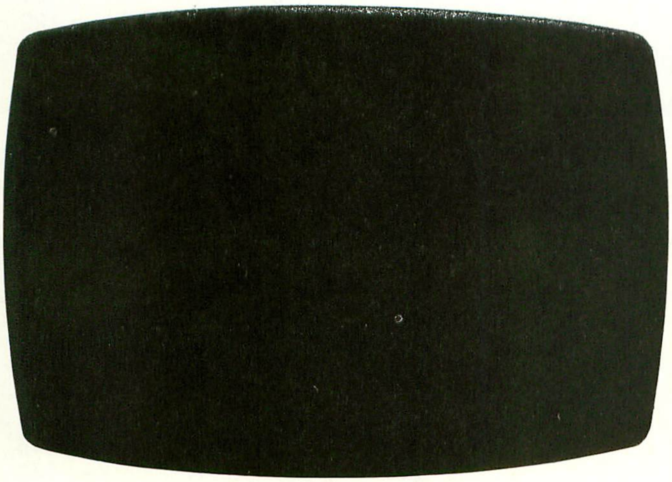
1. Graphic
2. Draw
3. Rainbow
4. Tune Rite
5. Etch Sketch
6. Baby Pro Sound and more

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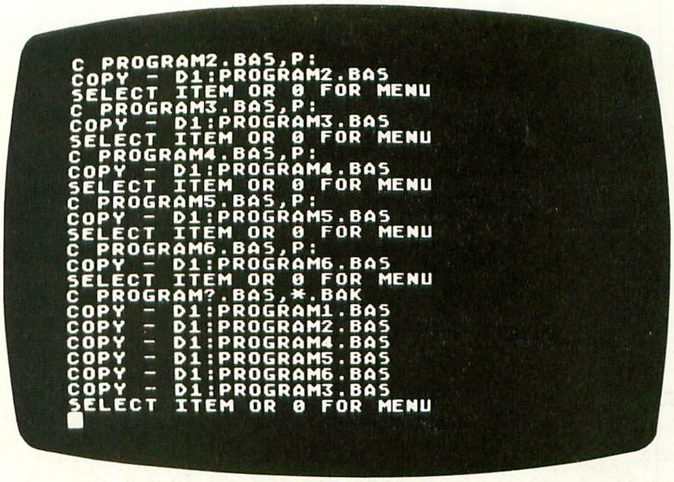


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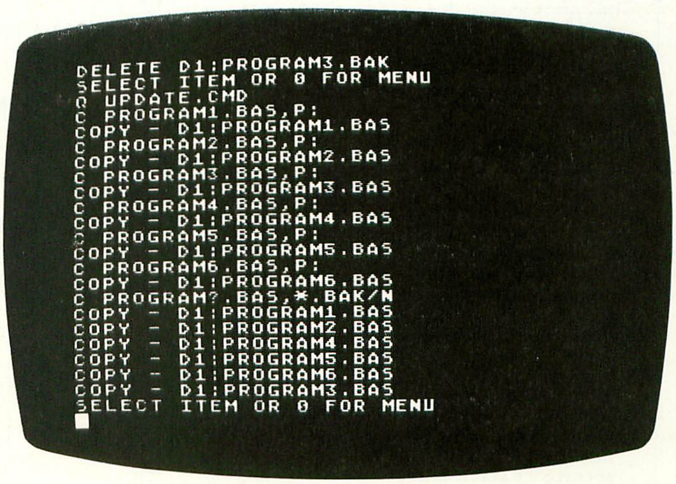


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Table Information

Our custom font listings represent each ATASCII character as it appears on the video screen. You generate some characters by a single keystroke, for example, the regular alphabet. Others require a combination or sequence of keystrokes. In this table, ESC means *press and release* the escape key before pressing another key. CTRL or SHIFT means *press and hold* the control or shift key while simultaneously pressing the following key.

The Atari logo key (人) "toggles" inverse video for all alphanumeric and punctuation characters. Press the logo key once to turn it on; press again to turn it off. On the 1200XL there is no logo key; inverse video is controlled by a key on the function row. Decimal values are given as reference, and correspond to the CHR$ values often used in BASIC listings.

NORMAL VIDEO

FOR THIS	TYPE THIS	DECIMAL VALUE
	CTRL ,	0
	CTRL A	1
	CTRL B	2
	CTRL C	3
	CTRL D	4
	CTRL E	5
	CTRL F	6
	CTRL G	7
	CTRL H	8
	CTRL I	9
	CTRL J	10
	CTRL K	11
	CTRL L	12
	CTRL M	13
	CTRL N	14
	CTRL O	15
	CTRL P	16
	CTRL Q	17
	CTRL R	18
	CTRL S	19
	CTRL T	20
	CTRL U	21
	CTRL V	22
	CTRL W	23
	CTRL X	24
	CTRL Y	25
	CTRL Z	26
	ESC ESC	27
	ESC CTRL −	28
	ESC CTRL =	29
	ESC CTRL +	30
	ESC CTRL *	31
	CTRL .	96
	CTRL ;	123
|	SHIFT =	124
	ESC SHIFT CLEAR	125
	ESC DELETE	126
	ESC TAB	127

INVERSE VIDEO

FOR THIS	TYPE THIS	DECIMAL VALUE
	人CTRL ,	128
	人CTRL A	129
	人CTRL B	130
	人CTRL C	131
	人CTRL D	132
	人CTRL E	133
	人CTRL F	134
	人CTRL G	135
	人CTRL H	136
	人CTRL I	137
	人CTRL J	138
	人CTRL K	139
	人CTRL L	140
	人CTRL M	141
	人CTRL N	142
	人CTRL O	143
	人CTRL P	144
	人CTRL Q	145
	人CTRL R	146
	人CTRL S	147
	人CTRL T	148
	人CTRL U	149
	人CTRL V	150
	人CTRL W	151
	人CTRL X	152
	人CTRL Y	153
	人CTRL Z	154
	ESC SHIFT DELETE	156
	ESC SHIFT INSERT	157
	ESC CTRL TAB	158
	ESC SHIFT TAB	159
	人CTRL .	224
	人CTRL ;	251
	人SHIFT =	252
	ESC CTRL 2	253
	ESC CTRL DELETE	254
	ESC CTRL INSERT	255

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